

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXVIII: No. 2.

New York, Thursday, July 14, 1881.

\$2.50 a Year, Including Postage.
Single Copies, Ten Cents.

An Annealing Furnace for Small Articles.

In the report of the Chief of Ordnance for the year 1880, Lieut.-Col. Whittemore describes an annealing furnace used at the Frankford Arsenal for annealing copper and brass shells, cannon-primer tubes, &c. As the furnace is well designed, and, as will be seen, has proved very successful for its special object, it will no doubt prove of value in many branches of manufacture, where similar operations must be daily repeated with a large quantity of small articles. Lieut.-Col. Whittemore has reported as follows: It consists of the furnace proper, constructed of boiler iron, lined with fire-bricks, and arranged with flue and cold blast for draft and heat; of an annealing retort, cylindrical in shape, with closed ends of hemispherical form. From these ends project trunnions, which revolve on friction rolls attached to the furnace. The left trunnion, looking toward the furnace, is hollow, and subserves several useful purposes. It is a peep hole for observing the degree of heat to which the charge is being raised, an outlet for the smoke into which the oil on the shells is converted, a means of obtaining samples for test, and of emptying the charge when sufficiently annealed. The annealing accomplished in this tight-jointed receptacle possesses several advantages over the old plan. In the latter the cylindrical vessel used was pierced with holes and revolved with its charge over a charcoal fire. The surface of the shells became considerably oxidized from exposure to the atmosphere and took up some dirt, as ashes from exterior surroundings, during the process. By the new plan the charge is protected from the direct action of the fire, and the gases and smoke generated and expanded inside the retort flow out through the hollow trunnion. By the old method charcoal was necessary as a fuel, to guard against the sulphur and other gases which would be generated from burning anthracite coal. Anthracite coal is used with the new retort, and the shells are annealed with less oxidation of their surfaces, and consequently require less pickling and cause less wear upon machinery and tools in the continued process of drawing. Ten thousand shells or thirty thousand cannon-primer tubes is a full charge for the retort. From 180,000 to 200,000 shells can be annealed in one day of 10 hours, at an expense of about \$5.25. An equal number by the old method would take 3 days and 6 hours, at an expense of about \$18.75. New process—amount of anthracite coal consumed in annealing 180,000 shells = 600 pounds, at a cost of \$1.50. Old process—15 barrels charcoal at 35 cents = \$5.25. A crane takes the retort from the furnace and deposits it upon a cradle, from which it is readily emptied. The retort, with full charge, weighs about 600 pounds. The furnace has a hinged wrought-iron cover, which is lowered over the retort during the operation of annealing, and raised when the retort is removed, and a hinged flue, which fits into an opening in the cover, connecting it with the draft. The accompanying drawing shows the general construction and operation of the furnace, which was designed by Mr. Jabez H. Gill, master machinist at Frankford Arsenal.

SCIENTIFIC AND TECHNICAL.

Referring to Prof. Thurston's recent experiments with copper tin alloys, the *Engineer* makes some very interesting statements concerning an alloy called

"NAVAL BRASS."

It appears that in the early part of 1874, in consequence of numerous cases of failure in respect to Muntz metal in ships of the Royal Navy, the attention of the Admiralty was drawn to the subject, and they directed inquiry to be made as to the cause of these failures. Mr. Farquharson, to whom the matter was referred, found that the causes of decay which had been suggested would not account for that which actually took place. In the numerous cases which came under his notice, two conditions of use were always observable, namely, salt water and contact with an electro-negative metal—a fact which pointed strongly to electro-chemical action as the cause of the change. On the other hand, there was a total absence of surface-pitting. To the eye the surface of affected bolts was as smooth and perfect as when they were first made. It was difficult to understand how an internal change, such as actually took place, could come to pass in the way inferred. Fortunately, a very simple expedient proved beyond doubt that salt water had penetrated an apparently sound and close metal, and the mystery was thus dispelled. Bolts, 3½ inches in diameter, which had been used for securing propeller blades, were shown to have been thus penetrated to the center. In view of these facts, the conclusion that a portion of the zinc had been dissolved out was inevitable, and this explanation has been thoroughly verified by comparing analyses of affected and unaffected parts of the same bolts. The circumstance that no such change was to be found in any of the numerous varieties of gun-metal, rendered it probable that it was peculiar to alloys of copper and zinc, so that if a forgeable metal could be produced with tin in its composition, having the requisite strength and ductility, the alloy thus formed would be free from the

defect complained of. In the latter part of the year an alloy, composed of 62 parts of copper, 37 of spelter and 1 of tin, was proposed by Mr. Farquharson, as possessing the requisite mechanical properties. The Admiralty thereupon referred the question as to the endurance of such metal to Dr. Percy, of the Royal School of Mines, in conjunction with Mr. Farquharson. These parties, after subjecting an alloy of this description to severe tests, under which the Muntz metal completely failed, reported to the Admiralty in 1879 that the new compound had stood the tests satisfactorily. Accordingly it was adopted as the service alloy under the title of "naval brass." The process of manufacture is the same as for yellow or Muntz metal. To insure the best results, Australian or English B.S. copper should be used, and the proportions of metal stated above closely adhered to, due allowance being made for the loss of zinc in the process of melting. When finished cold, and left unannealed in rods and sheets of moderate thickness, the metal has a tensile strength of from 67,000 pounds to 72,000 pounds per square inch, according to the amount of rolling it has received. Bolts of any size can be made of it, the usual practice being to take a rod the size of the bolt required, and to form the head by upsetting in a die. This is done, without stress or injury to the metal, in a bolt or rivet-making machine with heads two diameters of the bolt.

At a meeting of the British Association of gas managers at Birmingham, Dr. C. W.

ing the first results of distillation to flow into the heating gas main, then for two consecutive hours into the illuminating gas main, one-third of volume heating and two-thirds of illuminating gas would be obtained, with this important difference, that the illuminating gas would be of 16.16 instead of 13.5 candle power, and that the heating gas, although possessed of an illuminating power of 11.05 candles, would be preferable to the mixed gas for heating purposes, in being less liable in its combustion to deposit soot upon heat-absorbing surfaces, and in giving, weight for weight, a calorific power superior to olefant gas.

The *Gas Engineer* reports the beginning of the manufacture in England of

STEEL AND WROUGHT-IRON GAS PIPE.

Messrs. Exton, Berridge & Partners, of Westminster, are now manufacturing steel pipes and wrought-iron pipes made from rolled sheets. The operation, from the heating of the rolled sheets to the intermediate stage of bending to the required curve, is exceedingly brief, while the final jointing of the pipes by hydraulic pressure may be said to be even more rapid. By this process pipes may be made of almost any diameter—they are now usually made between 5 and 36 inches diameter—and in thickness varying from one-sixteenth to three-eighths of an inch, according to the purposes for which they are required, and up to 12 feet in length. The steel pipes made by this process are tested to stand an internal pressure

AN IMPORTANT IMPROVEMENT IN GUNNERY, which will lead to a material reduction in the expenditure on ordnance for the German navy and army. All the heavier Krupp guns consist of a steel body strengthened by hoops, the 30½ centimeter guns having three tiers of hoops, the 26 centimeter and 24-centimeter two, and the remainder one tier. The interior of the body, or the bore of the gun, being the part subjected to the greatest wear and tear, becomes rapidly worn out, and hitherto it has been found necessary, after, at the very most, 1000 rounds have been fired, to melt up the whole gun, on account of the damaged condition of the bore, although the outer parts of the piece were practically as good and sound as ever. Since the construction of these outer hoops is very costly, the idea occurred to one of the members of the firm that it might be possible to localize the melting operation; and this has now been found possible to accomplish by treating the body of the piece with a cold-producing preparation of carbonic acid, which contracts it to such an extent that the hoops, expanded at the same time by the application of heat, can be easily removed.

The *English Mechanic* describes

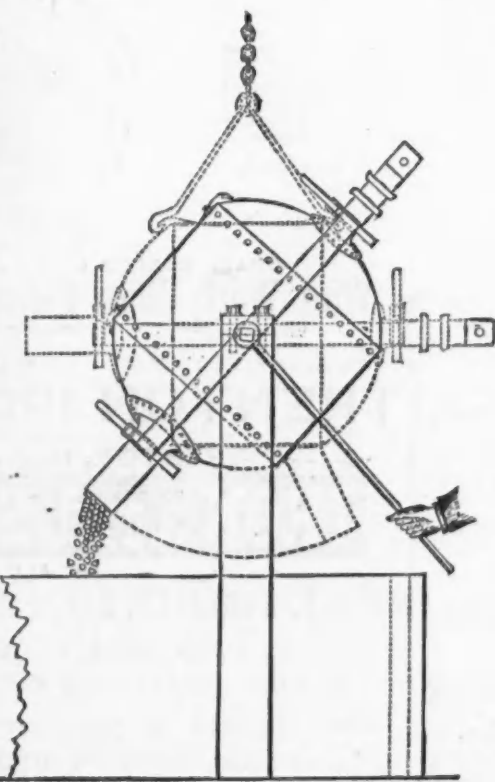
A NIGHT LIGHT CLOCK,

which has at the same time the great advantage of being noiseless. The reservoir or receptacle for containing the oil is formed of any desired material, and can be cylindrical or any other suitable shape, provided

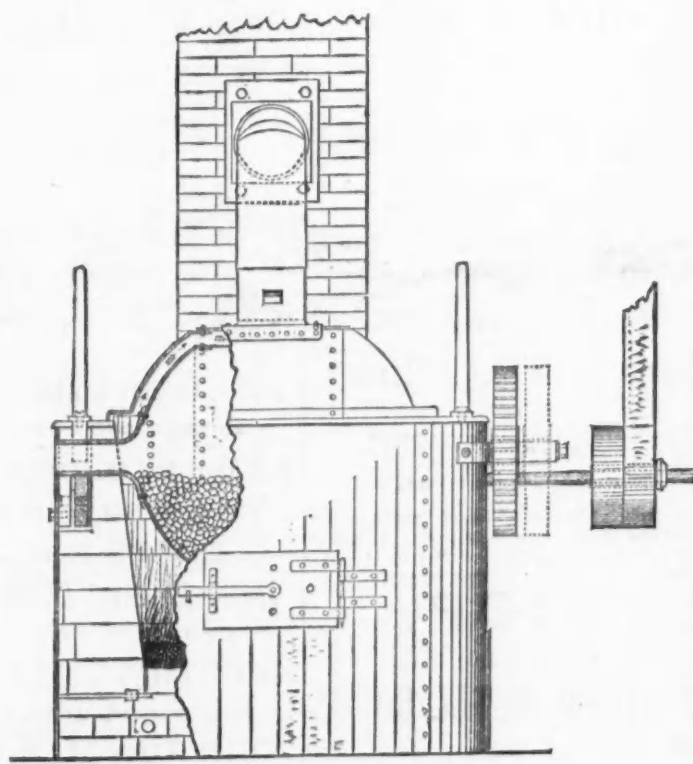
earth upward" does not merely include the driving of the tube, but also the employment of a pump attached to the tube to cause the flow of water when the well is a new-flowing well. The patent has been infringed even though the person using the well and the pump and the process may not be the person who caused the rod to be driven, the hole to be made, the tube to be inserted, the pump to be attached. Judge Blatchford holds that a patent is not vitiated if the inventor does not know or does not set forth the scientific principle of his invention, a plea which was made against the Green patent.

The Hardening of Steel.

The tempering of steel is a question which is attracting considerable attention at the present time, especially the relation between the metal and the gases which come into contact with it during the process of manufacture. An interesting communication on the subject was recently made to the Physical Society by Prof. Chandler Roberts, of the Royal School of Mines, and his principal result, though of a negative kind, is valuable as narrowing the question at issue. Prof. Roberts began by tracing the history of our knowledge concerning the carburization of iron, from the work of Clouet, at the end of last century, to that of Marguerite in 1856. Marguerite showed that, although the conversion of iron into steel could be effected by contact with carbon, even in the diamond form, it is, nevertheless, true that carbonic oxide ordinarily plays a considerable part in the process. Graham's paper "On the Occlusion of Gases," read in 1867, gave singular point to this conclusion by showing that carbonic oxide can penetrate to the center of a mass of iron. This gas is, in fact, introduced into the iron at a comparatively low temperature, while a high temperature is necessary to enable the metal to appropriate the carbon in order to become steel. The effect of occluded gases in iron and steel is now being carefully studied by metallurgists in general, and a committee of the Institution of Mechanical Engineers recently raised the question in one of their reports, as to whether the hardening and tempering of iron and steel might not be produced by the expulsion of occluded gases during the heating process, and their subsequent exclusion by the sudden cooling and contraction. Prof. Roberts has undertaken to answer this question, and by heating rods and spiral wires of steel *in vacuo* by means of the electric current and suddenly quenching them in cool mercury, he demonstrates that steel will harden when there are no gases to absorb. The metal was, of course, robbed of its occluded gases by means of an air pump connected to the vacuum chamber, and the parts which were quenched in the mercury were found to be glass-hard, while those which did not reach the cold fluid were found to be quite soft. Prof. Roberts, therefore, concluded that gases do not play any part in the process of hardening and tempering. Historically interesting are the facts mentioned by Prof. Roberts, that as early as 1781 Bergman clearly stated that fixed air could give up its carbon to iron, and that Reaumur in 1722 actually employed the Torricellian vacuum in experiments on the tempering of steel, the metal being placed red hot in a highly-rarefied atmosphere, thereby anticipating the methods of to-day by more than 150 years. An interesting discussion followed the reading of the paper. Prof. Hughes, who has made numerous experiments on the subject, expressed his opinion that the temper of steel was due to the chemical union of the iron with the carbon. At low temperatures this union takes place only in a slight degree, and hence in soft steel we have the carbon keeping aloof from the iron; but as the temperature is raised the combination is furthered, until in the case of gray or glass hard steel we have really a kind of diamond alloyed with iron. Sudden cooling is necessary to fix the combination, for in slow cooling the carbon separates out again from the iron. This theory is a very promising one, and is supported by a variety of facts; Mr. Stroth, for example, having observed that when an electric spark passes between two iron contact pieces and fuses them, the fused part becomes diamond-hard and will scratch a file. Recent researches by Mr. T. W. Hogg have also led him to a similar conclusion, namely, that temper of steel is due to the presence of an unstable compound of iron and carbon. The theory might very well be tested by chemical analysis in order to see whether the proportion of carbon appropriated by the metal increased with the temperature, or if any change took place in the refractive index of the steel. It was generally agreed by all the speakers at the meeting that the color of the surface of tempered steel depends on the temperature, and is due to the thickness of the film or skin of oxide; the blue film signifying a higher temperature than the yellow, as well as a thicker coating. In this connection Prof. Hughes has demonstrated that the electric resistance of the film increases with the temperature. A novel illustration of metallic skins was furnished by Prof. Guthrie, who exhibited a steel chain to which he had given a beautiful bluish-black protective coating by simply dipping it in melted nitrate of potash or common niter. The process was discovered accidentally, and as the bloom improves the appearance of the metal, it will probably be applied to utensils of iron and fancy articles.



THE GILL ANNEALING FURNACE.



Siemens again called attention to his proposal to manufacture

HEATING GAS

at the same time that illuminating gas is made. His suggestion consists in providing over each bench of retorts two collecting pipes, the one being set aside for illuminating, and the other for a separate service of heating gas. The gas coming from a retort varies greatly in its character during progressive periods of the charge. During the first quarter of an hour after closing the retort the gas given off consists principally of marsh gas (CH_4) and other occluded gases and vapors, which are of little or no use for illuminating purposes; from the end of the first quarter of an hour, for a period of two hours, rich hydrocarbons, such as acetylene (C_2H_2) and olefant gas (C_2H_4) are given off; whereas the gases passing away after this consist for the most part again of marsh gas, possessing low illuminating power. M. Ellissen, the late chief of the experimental department of the Paris Gas Works, and actual President of the French Society of Gas Engineers, has made a most interesting series of experiments, which he carried out in connection with the late M. Regnault, the eminent physicist, some years ago; the object of the experiments being to discover the proper period of time to be allowed for each charge. Although the average illuminating power produced by the distillation of the coal did not exceed 13.5 standard candles, the gas given off from the end of the first quarter of an hour, during a period of two hours, possessed an illuminating power of 16.16 standard candles.

According to the figures given in the valuable experiments of M. Ellissen, it appears that nearly two-thirds of the total production of gas takes place in the above period, while the remaining third is distilled during the first quarter of an hour and the last hour and three-quarters. It hence follows that by changing the direction of the flow of gas at the periods indicated, allow-

ing 500 pounds and upward to the square inch, and, as a matter of course, are exceedingly light.

German physicians and builders after a series of practical tests speak very highly of the properties of

TRIPOLITH,

a substance manufactured to replace plaster of Paris for surgical operations, and for stucco plaster and other work in the building trades. It is manufactured by Messrs. Gebrüder von Schenk, of Heidelberg, and is remarkable for the rapidity with which it sets, its lightness, strength and polish. It is said to resist the action of water very well. It is made of impure gypsum, three parts of which are ground together with one part of silicate of lime, nine parts of the mixture being ground together with one part of coke. The material is then heated and stirred, without the addition of water, at a temperature of 248° F. As soon as the water of crystallization of the gypsum has been expelled the temperature is raised to 500° F., the product being a gray powder. The color of the dry mass is silver gray, and besides setting in a pure state in four to five minutes, it can be made to harden after five to six hours by the addition of water in which some glue has been dissolved. By comparative test it was found that after setting, it took plaster of Paris 147 hours longer to dry than tripolith. The latter is also 14 to 16 per cent. lighter, an important advantage for surgical operations and for use in stucco work. After it has been given a coat of oil it holds color very well. As it grows older, set tripolith becomes firmer. Plaster of Paris has a tensile strength of 7 to 8.25 tons per square inch, while a sample of tripolith, after two months, had a tenacity of 15.2; after four months, 15.01; after six months, 17.5; and after eight months 17.5 tons per square inch. It is reputed to be 30 per cent. cheaper than plaster of Paris.

It is reported that Krupp, of Essen, has succeeded in making

that its internal capacity is the same throughout its entire depth. At the upper part of the said reservoir is fixed, in a vertical position or nearly so, a dial or clock face, through the center of which passes, in such a manner as to be capable of turning freely, a spindle, to one end of which is fixed a hand for indicating the time, and on the opposite end is mounted a small pinion. A float is placed within the oil reservoir, and to the top thereof is attached a rod fixed vertically, the upper end having a rack thereon which gears into the before-mentioned pinion. The wick-holder is arranged in any suitable manner at the upper end of the reservoir, and when the clock face is transparent, it is placed behind the same, thus effecting the double purpose of illuminating the said clock face and also of modifying the light; the wick passes through an aperture or space in or at the side of the float or in any other suitable manner to the oil. The action of the apparatus above described is as follows: It having been ascertained that a certain quantity of oil will be consumed in a certain time, and that consequently the float will descend a certain distance with the alteration in the level of the oil, the rack and pinion are so formed that on the rod descending with the float the pinion will be caused to revolve, and with it the hand, which will indicate on the clock face a period of time corresponding to that occupied in the consumption of the quantity of oil referred to. When the lamp is lighted the hand may be moved to the exact time by putting the rack out of gear with the pinion and turning the hand round.

Judge Blatchford, of the United States Circuit Court of the Northern District of New York, has recently rendered a decision in the case of Andrews vs. Cross, which involved the validity and use of the Green driven well patent. The claim for a process of constructing wells "by driving or forcing an instrument into the ground until it is projected into the water without removing the

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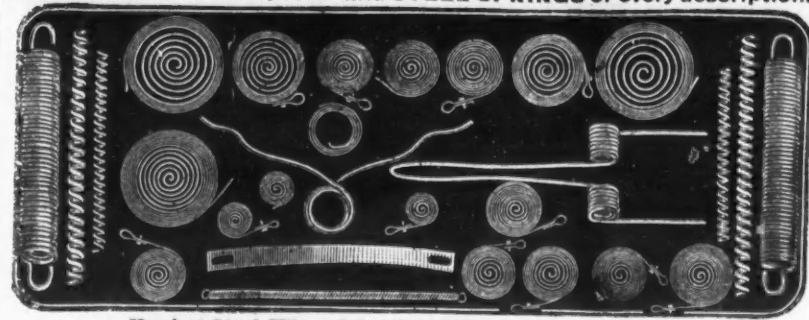
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Improved Universal Force Pumps.

Mr. W. S. Blunt, whose name has been known to our readers for a long time in connection with the "Universal Force Pump," has recently brought out a number of new styles and has materially improved upon former patterns. The accompanying illustrations show some of these pumps which are worthy of notice. The first of them, Fig. 1, is a form of the pump called the "Lotus." It is a "cistern pump," suitable for use in all positions where a pump of this class is ordinarily placed, but having some additional advantages of its own. It is provided with a stop-cock on sink spout, which is a great convenience when forcing water through an upper nozzle. Fig. 4 shows another form of the same pump. In general the series of pumps bearing the name

via New York is \$6 per ton. Both these roads are a part of the Wabash combination.

The Tehuantepec Railroad.

Wm. J. McAlpine, consulting engineer of the Tehuantepec Inter-Ocean Railroad, has just returned to New York after four months' absence on the route, and speaks of this really grand enterprise, of which the public know comparatively little, as in full progress toward successful completion. Between 4000 and 5000 men are at work, of whom 3000 are on the northern end, where there are now 15 miles of finished road. As much more will be in operation in a few weeks. At the southern or Pacific end work was commenced in the middle of April last.

We were favored by Mr. McAlpine with

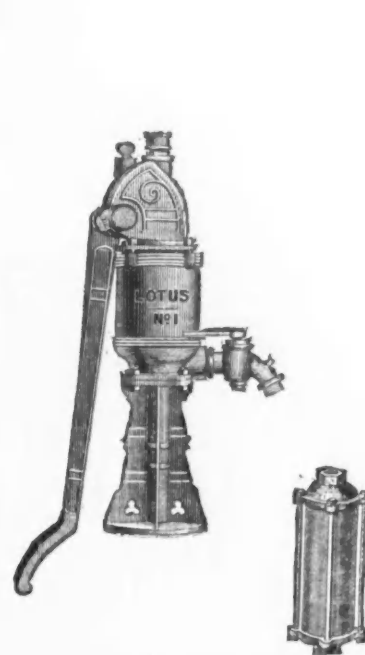


Fig. 1.—The "Lotus" Short Standard Non-Freezing Set-Length Pump and Cylinder.

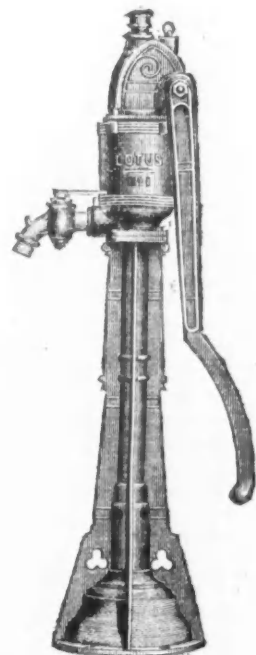


Fig. 2.—The "Lotus" Adapted to Use in Deep Wells.

"Lotus" may be described together. All of them are provided with a working head with an upper nozzle, which is intended to be used with hose or for pipe leading to a tank. The handle and interior crank are secured in a very simple but effectual manner in the head, which rests and rotates upon the air chamber, thus enabling the handle to be used with the pump in any desired position. The air chamber is so constructed as to be reliable at all times, and all parts of the pump are so adjusted that the water enters at the base of the pump, and passes up in a straight line and out of the upper nozzle on its way to the tank, thus avoiding unnecessary turns and consequent friction. A side spout is screwed into the air chamber for use at the kitchen sink, or for the attachment of hose for use at fires or irrigation. The external fittings, and a somewhat novel arrangement for disconnecting any portion of the pumps, their great length of stroke and unusual power, together with the finish given them and the durability of the parts,

full information. He was asked how the prospects of the Tehuantepec route compare with the proposed Lesseps canal or Eads' great ship canal, which secure so much more of public attention. Said he: "Two years from now we shall have the route through and in operation from ocean to ocean. Lesseps', it is said, will be finished in 10 to 20 years, and Eads' canal will be nearly or quite as long in building. Each of those works will cost not less than \$500,000,000, the annual interest of which would pay a dividend of 300 to 400 per cent. on the investment in the Tehuantepec railway, viz., \$6,000,000. Hence," said Mr. McAlpine, "competition between these works is out of the question." He added that if the traffic contemplated by the projectors of Eads' scheme is realized as to volume, two tracks on the Tehuantepec road would do the whole of it, and such two-track railroad would cost less than \$10,000,000, against the \$500,000,000 required for either of the other projects.

For those who are not familiar with that



Fig. 3.—Deep Well Non-Freezing Force Pump.

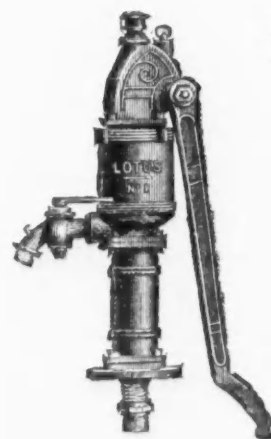


Fig. 4.—The "Lotus" Common Form, with Outlets for Pipe or Hose.

commend the pumps for general use. Fig. 2 shows a form of the "Lotus" adapted to use in deep wells. Fig. 3 shows a deep-well, non-freezing force pump having no air chamber. It has a rotating head and two nozzles. The small cuts to the right of Figs. 1 and 3 represent the cylinders which are used in connection with these pumps, and which are made in two styles. Purchasers have their choice between iron cylinders and cold-drawn brass cylinders. The general appearance of the two styles is the same, and both are furnished with polished raised brass valve seats. Mr. Blunt's place of business is 94 Beekman street, New York.

Eight carloads of railroad iron, the first of a lot of 8000 tons for the St. Louis, Des Moines and Northern and the Des Moines and Northwestern, purchased in Wales, arrived at Des Moines, Iowa, on the 20th ult., via New Orleans and Mississippi Barge lines, with through bills of lading from Liverpool, the first of the kind. A Des Moines dispatch to the Chicago Tribune says: The order was made by cable, and was necessitated because the mills in this country could not supply it, being overrun with orders. The saving on freight by this route over that

part of Mexico bordering on the Gulf, it may be observed that the Tehuantepec road (for which Mr. Edward Larned, of Pittsfield, Mass., obtained a full concession) will run very nearly north and south, the northern terminus being at the mouth of the Coatzacoalcas River, which is almost due south from New Orleans. Its length will be 160 miles, and the saving in distance between New York and San Francisco, compared with the Panama route, will be 1152 miles each way, or compared with the voyage around Cape Horn, 21,534 miles on the round trip. According to Mr. McAlpine, who has carefully surveyed the entire line, there are no unusual difficulties in building the road, as the grade nowhere exceeds 60 feet to the mile, and more than one-half of it is of the cheapest construction, nearly following the surface of the earth. The most expensive portion of it, and that extending a short distance only, will not exceed \$60,000 per mile, making an average for the whole of not more than \$25,000 or \$30,000 per mile.

So quietly has the work proceeded that many will be surprised to learn that not less than 33 cargoes of material have been shipped to the Coatzacoalcas River up to the present date, most of them from New York, though the rails go from England and about

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SCRAP OF ALL KINDS A SPECIALTY.
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NEW AND OLD RAILS,
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Manufacturers of the Keystone Patent Solid
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These Shoes are made of superior iron and steel,
completely finished and ready for cold shoeing;
have clip and solid steel calk. The holes are
punched through at the proper angles and free
from burrs. Same number of Shoes per keg as in
kegs of unfinished shoes.

50,000 ties from Florida. Most of the ties,
however, are found on the spot, comprising
mahogany, rosewood and grissima, the two
latter having a close resemblance. Lately
the chartered steamer Vidette left this
port, taking out a number of engineers, a
locomotive steam excavator and steam saw
mill, besides large quantities of shovels,
picks, barrows, corrugated iron for roofing,
and other material.

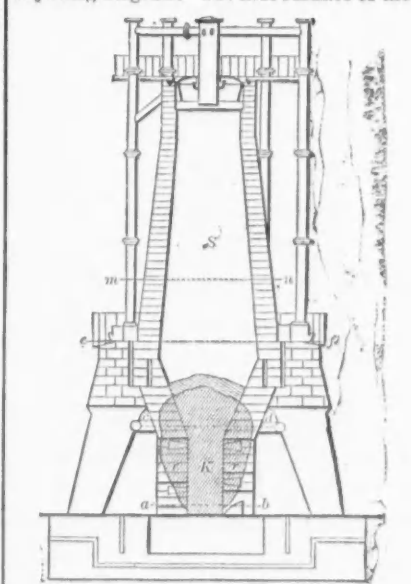
A reason for special satisfaction is found
in the selection of Salina Cruz as the harbor
at the Pacific terminus, and which will serve
as the base of operations on that coast; but
the design is eventually to occupy Chipequa,
where at no distant day will be one of the
finest harbors on the Pacific coast. Altogether,
the accounts brought by Mr. McAlpine are
of a very cheering nature. The resident
chief engineer is Mr. Van Brocklin, formerly
engineer of the New York Elevated Railroad.

An Obstructed Blast Furnace.

An obstruction in a large blast furnace is
perhaps the worst mishap that could befall an
iron smelter. Its cause is generally the incom-
plete reduction and carburization of the iron,
which, either from want of care in the
management of the furnace (when the bur-
den hangs on one side of the boshes and
forms scaffolding, which suddenly rush
down in the crucible in an unfit condition
for being melted), or in consequence of an
overcharge with ore and deficient fluxing,
accumulates in the hearth and goes on grow-
ing until it reaches above the tuyeres and
finally chokes the furnace. Such an accumu-
lation of iron, generally termed a "sow,"
a "bear," or a "salamander," can only be
prevented by a diligent heaving out of all
masses of badly reduced ore, as soon as it
arrives in the hearth, and by an alteration
of the burden and mixture, generally by
diminution of the ore burden, until the de-
ficiency of heat is restored to the furnace,
and the mushy cinder, which invariably ac-
companies the badly reduced ore, ceases to
be formed. Otherwise the gobbling of the
furnace becomes inevitable and its extinction
a certainty. To provide against such a
calamity, we have even seen brimstone
being fed through the tuyeres, in the hope
that it would eat up the sow, and thus com-
bine with its iron to a sulphide, that in a
fluid state may run out of the tap-hole.
Another cause of gobbling exists occasionally
in the nature of the fuel, particularly of an-
thracite, which, when getting hot, has a
tendency to fly to small pieces; such disin-
tegrated particles will collect in the cruci-
ble and hearth, which, if not constantly
heaved out, they will obstruct to such a de-
gree that the blast can no longer pass
through and perform its duty in raising the
heat required for the life of the furnace.
Such an instance we witnessed years ago at
a well-known iron works in South Wales,
when the unfortunate furnace was doomed,
because the closed breast, which was then
experimentally tried, did not allow to keep
the hearth as clean and free from anthracite
dust as was necessary. A third cause of
gobbling of a blast furnace, which is for-
tunately very rare, is an utterly defective
composition of the mixture, either from
too little fluxing with lime or from an excess
of it; the latter was the case on the occa-
sion which we are going to mention, which,
however, has taught a valuable lesson to
iron smelters that may be profitably
employed in future.

The case before us arose with one of the
well-known Büttgenbach blast furnaces
without shell, which have made their way
successfully through most iron-producing
countries. It originated in utter incompe-
tency of the management at the time, as
well as in a reckless disregard of well-known
chemical principles. As the case is highly
instructive, and shows what a Büttgenbach
blast furnace will endure, even if mal-
treated in an unprecedented manner, it will
be as well to point out briefly what the pecu-
liarities and advantages of this system
are, which was brought before the Iron and
Steel Institute, when in August, 1873, it
held its meeting at Liège, in Belgium.

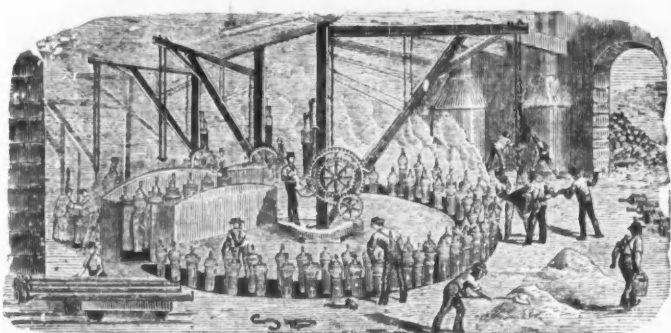
The general features of the Büttgenbach
furnace will be seen at a glance from the
adjoining diagram. The first furnace of the



kind was constructed by brothers Franz and
Conrad Büttgenbach in 1861, and erected in
1865 in Heerit, near Neuss, opposite Düs-
seldorf, in Rhineland, and after having been
for ten years running without interruption,
it was blown down in 1876, owing to the
great depression in the iron trade. Models
of it were exhibited at the international ex-
hibitions of Paris in 1867 and Vienna in
1873, when the system was much approved
of by all competent judges; so much so that
it was awarded a prize by the international
jury. There are now a number of furnaces
of this kind in France—namely, at Anzin,
La Rochette, Givors, Lez, St. Louis (near
Marseille), St. Dizier, Desforres and Celles;
in Germany at Neuss, Lauchhammer, Geis-
weid and Veckerhagen; and in Austria at
Schwechat, near Vienna. Everywhere they
have given complete satisfaction. The fu-

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General Foundry Work.

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For Boilers, Fire-Boxes, Smoke Stacks, Tanks, &c.

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File, Fork, Hoe, Rake, R. R. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c.; Cast and German Spring and Plow Steel.

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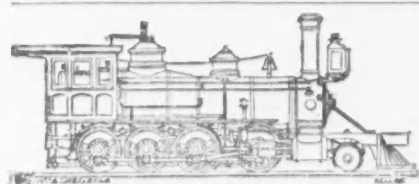
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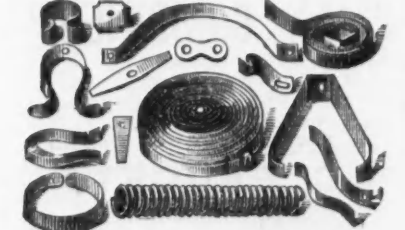
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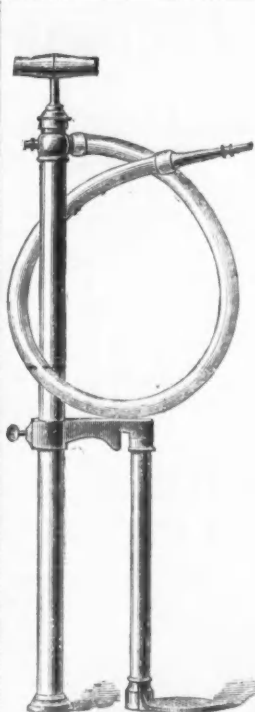
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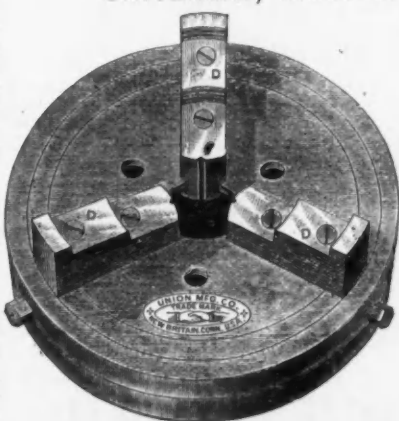
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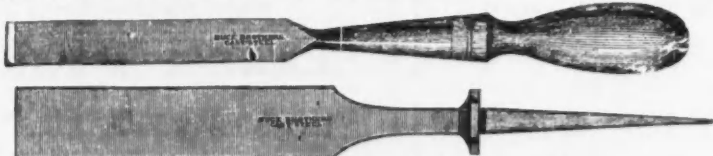


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Protoxide of Iron.....	.83
Manganese Oxide.....	.09
Alumina.....	4.43
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Silica.....	14.89
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damental idea of this mode of construction and the advantages of the Büttgenbach system may be summed up as follows: The brickwork of the stack is quite independent of the lower blast furnace. Each ring or course of bricks constituting the hearth, crucible, boshes and stack is readily accessible, and is quite free from any outer casing or shell, except for a height of 3 or 4 feet at its widest part, below *ef*, where the stack is supported by a circle of six arches. The advantage of this construction is that it conduces to the duration of the furnace, for in case of need any injured part can be repaired, even when the furnace is running. The stack or mantle, and the upper part of the boshes, being cooled by the surrounding atmosphere, they remain in their natural condition without wear, and do not become unduly heated at any time, by which means they are kept in a perfect state of preservation. The hearth, crucible and lower portion of the boshes, which are apt to suffer after a certain time from the destructive action of the melting materials, may be replaced without any difficulty while the work is going on; if the furnace is to be blown down, the lower part of the same can be completely taken away without injury to the stack. As each particular brick is accessible from without, the progress of corrosion by the heat can be easily ascertained and prevented by cooling them down with water, either by merely sprinkling them or by inserting water cooling boxes, or cooling rings and water tuyeres, so that the wear and tear is checked. The utilization of the waste gases can be so managed as to yield the greatest effect; the pillars which support the bridge are hollow, and can serve as gas pipes, when they carry the gases from the bell downward in an annular box of sheet iron around the base of the stack, at *ef*, where they get in contact with a large body of water, and deposit any dust which they carry from the furnace mouth. The gases consequently reach their destination in a very purified condition, and may be utilized either in the blast-heating stoves or with the steam boilers. The arrangement of the water box allows of the withdrawal of dust and grit deposited there while in full run, and in the event of an explosion the large area of the only water locked open space acts like a gigantic safety valve and prevents any injurious effect. In point of fact, instead of dreading explosions, they are perfectly welcome from time to time, as they are quite harmless, and clear the pipes from any dust and grit that may cling to their inner sides. The gas pipes, being the supporters of the bridge, render it quite independent from the furnace proper without involving any special outlay. The furnaces are also provided with a closed hearth of special construction, which was introduced by Mr. Büttgenbach in 1867, and admits of any working or heaving in the hearth of the furnace, if necessary, combining at the same time all the advantages of a closed breast. The hearth is closed in by a cast-iron tympan, placed in the usual position, the tympan being cooled by a current of water, which passes through a cooled pipe fixed in the cast iron. In the center of the tympan plate is an aperture or slit, nearly over its whole height, which may be tamped with ordinary clay, so that the upper portion of it is 2 or 3 inches higher than the central line of the tuyeres. Thus the slag, which ascends above the damstone, and reaches the level of the tuyeres, runs easily off through a cinder notch, which is driven in the slit by a light steel bar; and since the level of the notch may be altered at will, a means is afforded for changing the level over 24 inches, at which the slag is run off, while there is nothing to prevent the metal to be tapped at this same slit.

As we have already remarked, the performance of the Büttgenbach furnace has everywhere given great satisfaction. It effected an economy of 10 to 15 per cent. of fuel, while the first outlay was of course very much below that for furnaces of the ordinary type. With good coke, excellent foundry pig No. 1 could be produced at the Neuss furnace from 35 per cent. ore, requiring only 110 pounds of fuel for 100 pounds of crude iron. During the year 1870-71 the same furnace had to be damped down for ten weeks, owing to the impossibility of providing it with coke, and when turned on again, it did its work with surprising regularity. Experience has shown that the walls of the furnace, being only 2 feet thick at the base, and 18 inches at the stack, are hardly at all affected by the internal heat, either through expansion or contraction. Hearth, boshes and stack were originally kept together in the first furnace by means of flat-iron binders upon every third course of bricks. This precaution has, however, proved unnecessary, and in 1869 they were removed at the hearth and boshes, and partly at the stack, without the slightest inconvenience.

So much for the general peculiarities of the Büttgenbach furnace. We now continue to deal with the bad gobbing of the very first furnace of this type, 15 years after its construction. After the furnace had been blown down in 1876, it stood idle for nearly four years, and was blown in anew only in August, 1880, under a not at all competent, and, besides, reckless management. Already, in the fifth week after lighting, the furnace was completely gobbled up, from the bottom stone upward to 9 feet in the crucible and boshes; and as the manager had become quite helpless on September 25, Mr. Franz Büttgenbach was called in to help, when he found the walls between the original level of the tuyeres and the boshes, which had been from 3 to 4 feet thick, melted away to 6 or 8 inches and almost crumbling to pieces.

At this date the tuyeres had been gradually raised to about 9 feet above the bottom stone. They were perfectly dark, while the crucible and hearth were filled up with a cold solidified mass, which seemed to drive the walls asunder in such a manner that they showed rents from 3 to 4 inches wide. Above the tuyeres, however, white heat was still visible, and a thick, sticky cinder trickled down from there. Under these circumstances, it was out of the question to remelt the obstructing masses. The only possibility to save the life of the furnace was to remove the cold gobbing by breaking it away, and to rebuild the corroded part of the furnace, which was carried out in the following manner:

All tuyeres were taken out and all apertures carefully closed, while the top was covered in air-tight by the valves in the gas pipes, and by the lid, which was well secured to the top. In this condition the furnace remained four days, when, after examination with a 1/2-inch steel drill, it was found that the walls as low as *ef*, were still intact, without having even lost an inch during a ten years' campaign, and that the corrosion had gone up as high only as it had been possible to raise the tuyeres. Fortunately, the supporting arches had put a stop to this, otherwise the furnace would probably have been gobbled up to its very mouth. In the meantime, the necessary fire-bricks and materials had been procured from Messrs. Otto & Co., of Dahlhausen on the Ruhr, which firm made such a splendid show of refractory bricks and coke ovens at the Düsseldorf Exhibition, and from M. de Lattre, of Ardenne, Belgium. On the fourth day the reconstruction of the furnace began, so that the wall between two tuyeres was broken away to its whole injured height; the obstructing masses were easily removed so far that the original inner dimensions could be restored by walling the sides up with fresh material, when a second portion of the crucible was taken out and renewed, and so on until the whole lower structure was entirely rebuilt. The obstructing masses, from the bottom stone upward to the boshes, proved to be all of the same nature, consisting chiefly of a very basic slag, which, in contact with the air, crumbled to a white dust, mixed with some half-burnt coke, but with very little un-reduced iron ore or iron. In fact, they were formed by injudiciously adding about 30 per cent. too much of lime, as would have been required for a fusible basic cinder; and when the first accumulations began to show in the hearth, instead of changing it, this mixture was recklessly continued with, so that that the gobbing grew higher and higher, while the tuyeres had to be raised continually when any blast was to go into the furnace at all. After this reconstruction the lower part of the furnace showed in the walls six openings from the tuyere beds up to the boshes, and one at the front side, through which it was then not difficult to break out the rest of the lime obstruction, K, which had been left standing as a support to the glowing furnace charge above. After being taken out, it was found, however, that a cinder arch, *g*, had been formed by the cooling influence of the air, and that it kept the materials back, so that it was possible to fill the whole empty space below with about 20 tons of good dry coke, which was mixed with about 1 1/2 tons of siliceous glassy blast furnace cinder, upon a bed of logwood. After this operation the furnace was closed above the tuyeres up to the boshes, and it was then, after 14 days' work, as ready for a start as a new furnace which is to be blown in. The furnace top was then opened, the stack filled up to the brim with charges having a slight excess of coke, and, after the gas valves were re-opened, fire was set to the coke in the hearth, so that after 12 hours it was all on fire; and when now the blast was turned on from the newly replaced tuyeres, the fluid cinder soon filled the hearth to its usual height, and, after 15 hours' blowing, the first tap of iron could be made. The cinder arch had gradually given way and permitted the charges to descend in boshes and crucible. These charges have been four weeks in the furnace; the third tap, however, gave already gray foundry pig, and from that date the furnace has behaved as regularly as ever before.

The gobbing of lime weighs about 30 tons, and it seems almost miraculous that such a quantity could have been taken out of a furnace which had still life in it. This operation is certainly, perhaps, the strangest "Caesarean operation" ever performed upon an iron-blast furnace. Mr. Büttgenbach, the successful operator, is of opinion that an important lesson may be learned from this remarkable case, namely, that under special circumstances it may prove desirable to fill the crucible and boshes of a furnace with an infusible mass of lime on purpose, whenever its lower parts require a renewal, while the stack is still in a good condition, and it is desirable to avoid the loss of time and considerable expense which the blowing down and relighting of a blast furnace require. It is true that the gradual filling of a blast furnace with limestone has been done many a time before when it had to be blown down, in order to protect the bell and gas apparatus at the top against destruction from the heat, to which they are unavoidably exposed when there is no intermediate material ready to absorb it. We believe, however, that it is the first time that a similar procedure, with the clear intention of filling up the crucible with lime as a support to the superincumbent glowing strata of the burden in the stack, has ever been suggested in the manner proposed by Mr. Büttgenbach, and we recommend this valuable suggestion to the consideration of all practical iron smelters. The charges which contain the surplus of lime that is intended to fill up the crucible should be succeeded by ordinary ore burdens with an excess of fuel, about double the usual amount, and, if everything is well prepared, two or three weeks may be sufficient to reconstruct in this manner the lower part of a blast furnace, while the expensive process of blowing down can be quite avoided. Such an operation can, of course, only be carried out with a furnace which, like the Büttgenbach and all the furnaces of recent construction, are provided with an independent hearth and crucible instead of the old construction, where the whole ring-wall or inner lining used to rest upon it, which is now supported by the iron pillars, which also bear the after-casing or shell of the furnace. In all such cases, however, this proposal promises a great saving of cost and time, and we hope that the unfortunate gobbing of the Neuss blast furnace in the summer of 1880 and its successful cure may prove to be the commencement of a new and more economical era of blast-furnace management.—Iron.

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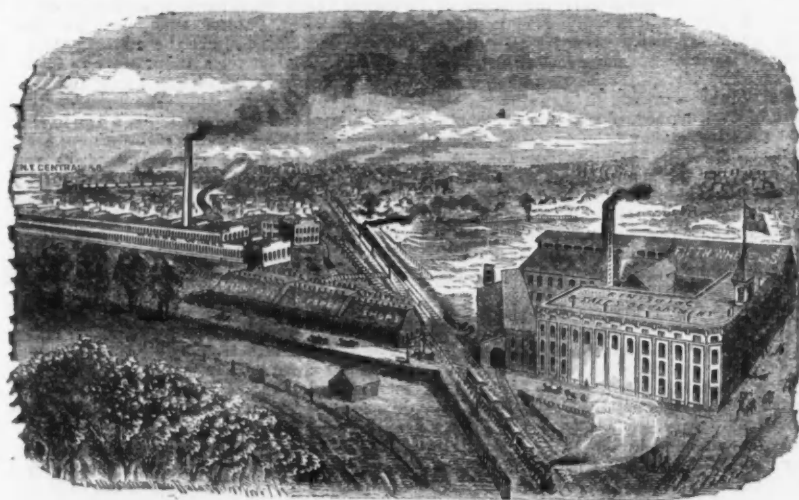
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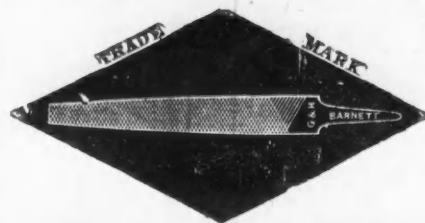
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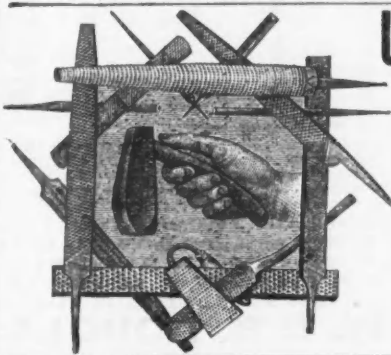
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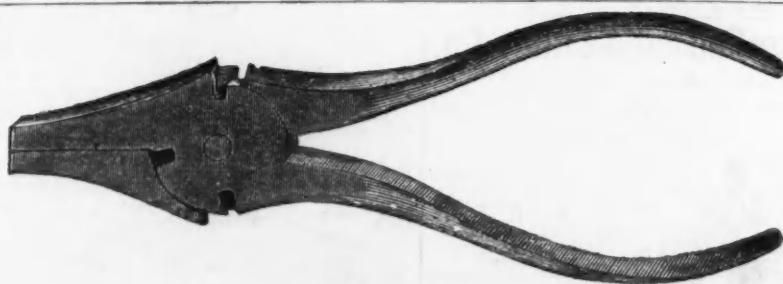
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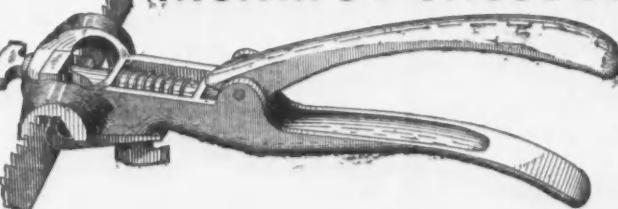
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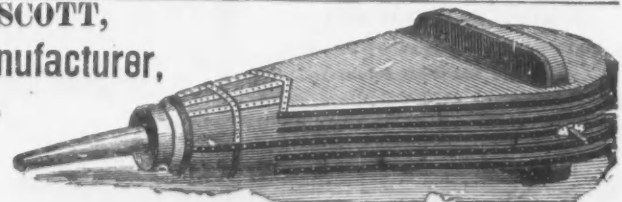
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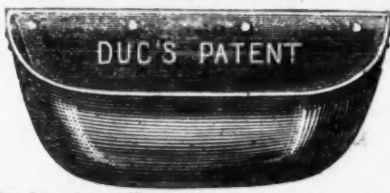
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London Underground Railways.

The London Underground Railway differs from all other English railways in this—that it has neither beginning nor end. Other lines are alternations of cuttings and runs in the open, more or less elevated above the natural level of the surface, occasionally varied by a tunnel; this is a continuous burrow, a succession of covered ways, with troughs of various lengths at irregular intervals, open to the sky for light, but more especially for ventilation. On other railways you measure space by miles; here you count it by chains and furlongs. Other lines run a dozen, perhaps 20 or 30 trains daily; the number of trains passing over the Underground every day is little short of 2000. The most thriving of other lines do not count up more than £100 sterling a mile in their receipts; the Underground yields over £1200 sterling a mile. Last year (1880) 150,000,000 of people passed over this line, and on Whit Sunday, 1880—the day when the greatest number went over it—the number of passengers traveling to and from different stations was 689,497. These facts at once prove the inestimable value and importance to Londoners of the Underground Railway, and show what a blessing it is to the vast population which must get quickly to its work, and to which the breath of country air, now within reach of the poorest, is life and health.

The first portion of the Metropolitan Underground Railroad, extending from Bishop's road to Farringdon street, was opened for public traffic on the 10th of January, 1863. It was then in the nature of an experiment. So prompt and grand was its success, that the work was continued, until now its ramifications extend in a thickly-webbed network, from almost every central and suburban point where people live, to every central and frequented point where people work.

Extensions were rapidly made westward toward Hammersmith and eastward into the city, having termini at Moorgate and Broad streets, while a branch line, joining the first at Baker street, extended northward to the secluded quarter of St. John's Wood. While one circle will carry you from Moorgate street via Euston road, Tottenham Court road and Edgware road, to Notting Hill and Kensington, an outer circle conveys you, by King's Cross, to the northern chain of suburbs, notably to Kentish and Camden towns. As the enterprise has become more and more extended, new improvements have been added, the tendency in England, as well as in America, being to increase the conveniences and luxuries of the traveler. More recently, open have been preferred to covered ways or tunnels, and every opportunity has been taken to increase the number of the former, so that the later ramifications are only to a certain extent underground. When the property which had to be purchased has been moderate in price, the line of the road has simply been made a valley instead of a burrow. But when, as occurred in one instance, the company have had to purchase rows of costly mansions, half built, this plan is too expensive. In many cases the tunnels have been run underneath large buildings, which have been underpinned, the business in which was not for a moment interrupted. For three miles of railway more than 50,000 cubic yards of earth was removed, and of the clay which partly composed it 22,000,000 bricks were made. The new stations are admirable structures in the adaptation to their purpose. The double station at Kensington High street is, perhaps, the largest and best of them, and may be briefly described:

The center consists of a spacious and lofty apartment, 44 by 35 feet, which is used as a refreshment room. The two ticket offices—for this station is double, as being at a junction between two lines belonging to different companies—are across the ends of the building. These, as well as the station walls and roofs, are very light, graceful and effective structures. They are faced with white perforated bricks; the doors and windows have semi-circular heads, and each window sash is filled with a single sheet of plate glass. The entrances to the ticket offices are under iron verandas roofed with glass. These offices are, of course, on a level with the street, and the station is surmounted with an ornate cupola. Galleries cross the rails overhead for exit, entrance or change of platform. Stairways descend underground from the offices to the platforms on either side, this subterranean apartment being lighted partly by skylights above and partly by globular lamps suspended over the platforms on either side. The station is abundantly supplied with closets, neatly fitted up for the convenience of passengers. The platforms are plank floors, and are sufficiently long to secure six English cars 42 feet long each, with engine and tender. Opposite the platforms, on the walls, are large signs with the name of the station, besides numerous advertisements of every imaginable commodity, in letters of every shape, size and color, some of them being really handsome pieces of ornamentation. The arrangements are so perfect that there is room enough for all, and although the train stops seemingly an instant in each station, it does not start until every passenger is, as the case may be, in or out.

As in most other English railways, the cars of the Underground are divided into first, second and third class, with accommodations and comforts corresponding and fares graduating accordingly. It is not, therefore, surprising to learn that the number of third-class passengers has always been greatly in excess of those of the two other classes combined. The best patrons of the Underground are the artisans, the people who live by the toil of their hands and the sweat of their brow; and it is to this great class that the Underground has itself been a boon of value to them incalculable. The percentage of first, second and third class passengers passing over the road is relatively as follows: First class, 10.94; second class, 20.29; third class, 68.77. These figures of themselves show that the Underground is essentially and emphatically a people's line. They are carried to and from their business in well-built, airy cars, which, if not cushioned and carpeted like the first-class cars, have, at least, clean wooden seats, wide windows and plenty of room. The average third-class fare for any distance is twopenny

(4 cents) each, being two-thirds less than the omnibus and tram-car fares, the speed of transit being thrice as rapid; but there are, besides, morning and evening hours, during which penny (2 cents) trains are run for the benefit of the workmen. Every such train is known as the workmen's train. The workmen may travel by trains running at intervals of five or ten minutes from 5 in the morning till 12:30 at night. Their fare is saved in shoeleather alone; for the laborer who now for his penny goes from his suburban cottage to his factory in the heart of the city, six or eight miles, by steam, was wont formerly to trudge it wearily, to the wear and tear of his constitution, as well as of his boots.

It may be interesting to know how this great line is managed, and what measures have to be taken to insure the public safety and comfort. Probably there is no man in London—not excepting even the Lord Mayor himself—with heavier responsibilities resting upon his shoulders than the manager of the Underground Railway. An outsider might think that the working of the line is easy enough—that it is only setting trains in motion and keeping them running to time. The general manager is commander-in-chief of the line, and pays for the power and dignity by bearing the responsibility for everything which goes wrong, and by receiving but scant acknowledgment for the great deal that goes right, and for the inevitable anxiety and eternal vigilance which are indispensable in the performance of his office.

If, at 4.30 a. m., we are "early birds" enough to be up and find ourselves at the big shed of the Edgware Road Station, we shall not have to wait long before seeing the engines turned out, which initiatory operation takes place 20 minutes before 5. The night before they have been thoroughly examined, oiled, cleaned and prepared for the ensuing day's work. They start off in rapid succession to the different termini of the line, where the empty trains are sheltered during the night. At 10 minutes after 5 the trains begin running according to the time tables. The engines arrive at the stations in succession, leaving again with the trains attached 10 minutes afterward. For example—an engine arriving at 5 a. m. leaves with a workmen's train at 5.10, and so on. At first there is plenty of room in the trains, the travelers in the very early morning being scant groups of sleepy folks huddled napping in this corner and that. As the morning advances the traffic increases, and now the trains are run in quick succession, the average intervals between them throughout the day being three minutes. At 7.27 p. m. the withdrawal of the locomotives begins, and continues till 1.15 a. m., when the last locomotive puffs into the Edgware Road shed, which is the resting-place of all the engines for the night. The last train is the Hammersmith train, which steams into Moorgate street at 12.40; the average number of passengers for the 20 hours having been upward of 250,000 on the Metropolitan alone. Besides this traffic of the Metropolitan proper, the Great Western, Midland, Great Northern and London, Chatham and Dover companies send more than 400 trains over the same rails every day. Of late the Metropolitan, or principal underground company, has become a sort of key by which the traffic of nearly all the railways branching out of London is interchanged. You may procure tickets from its stations to almost every point in the three kingdoms, and make connections accordingly from almost every part of the metropolis to your destination in the country.

Extensions of the two lines, known generally as the Underground Railway, are constantly in progress of construction. At one end the railway has been extended from Moorgate street, in the city, to Liverpool street, in the far east end of London, thus forming connection with the whole great eastern system of railways. Then a section was completed, some time ago, between Westminster and Cannon street, along the Thames, which has proved a boon to the thousands who used to crowd the little penny steamboats on their way to the city from the regions of Chelsea, Piccadilly and Brompton. One of the greatest blessings of the underground railway to the cockney world has been to thin out, in some degree, such choked up, dangerously crowded thoroughfares as Piccadilly, the Strand, Fleet street and Chancery. Since the opening of the Thames Side Railway, between Westminster and Cannon streets, the number of cabs and omnibuses which used to suffocate those great arteries of traffic has largely decreased; and, already, it is estimated, this "inner circle" of the Underground has thinned out 150,000 from the vast throng which crowds the central thoroughfare of the metropolis.

Statistics prove, too, that traveling by the Underground is less perilous to human life than riding or even walking in the streets. During last year nearly 400 persons were knocked down and killed, by vans and other vehicles, in London streets, besides the many hundreds that were injured, but more or less narrowly escaped death. But of the 150,000,000 who traveled by the Underground, only a very few lives were lost, and not a solitary one by any neglect or fault of the company's management.

The entire length, or more correctly, circle, of the Underground Railway, and all the branches, are fitted with the block system, and the machine by which the trains are worked is so ingeniously designed that it is almost beyond the range of possibility that a train should be run into the wrong station, or that there should be a collision. Nothing short of extreme negligence or criminal design could effect either of these calamities, for the instrument acts absolutely as a check upon any negligence on the part of the signalman. The management exercises the greatest care in the selection of subordinates, and the rules by which the latter are controlled are despotically strict. No one is taken into the service without a character, that is, a certificate of good behavior and habits from his previous employer; and, having entered the service, the employee is placed under very strict discipline—immediate dismissal being the peremptory penalty for carelessness. On the other hand the employees are encouraged to do well by a system of reward, for a yearly bonus is given to those who faithfully and zealously perform their task.

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Are warranted to be equal in style, finish and quality, to any goods made in the world.
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We shall in the future, as heretofore, be always prepared to fill orders at Manufacturers' Prices
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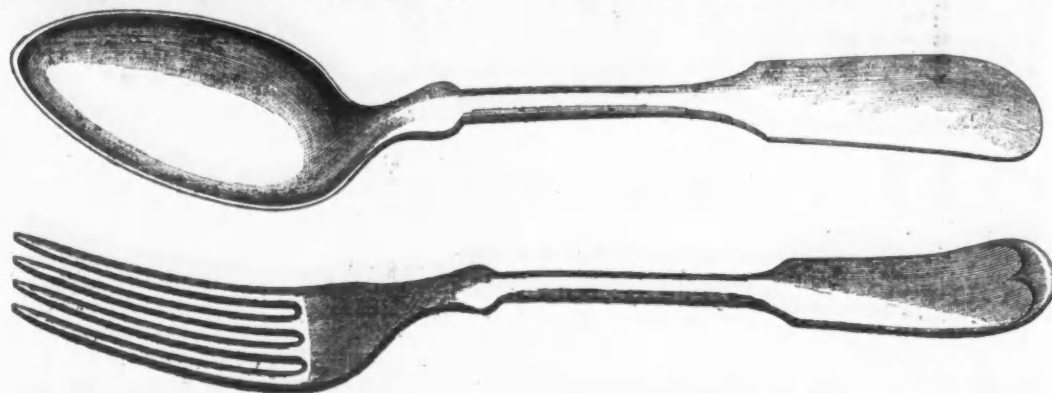
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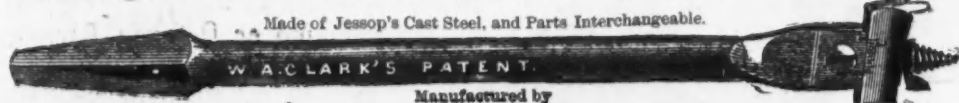
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Communications by letter will receive prompt attention.
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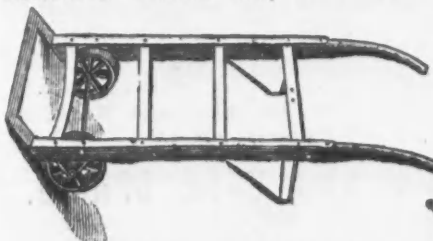
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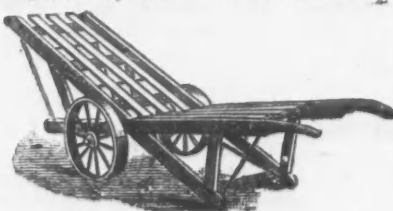
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With its countless omnibuses and cabs, tram cars and little Thames steamboats, and its Underground Railway now ramifying in every part of the metropolis where traffic is to be relieved and the streets made passable, it would seem that London is well supplied with conveniences for locomotion. But this age, whether in England or this country, is never content with its new facilities. The later tendency in England is to give the government as large control as possible over institutions which are for the general benefit, and it may be that before long there will not only be a government horse railway, at least on the Surrey side of the Thames, but that the Underground will itself be brought in and governed by the ministers of the crown. However, there is no predicting what innovations John Bull will assent to until his assent is fully given.

Business and Trade in Russia.

From the fact that Gen. Ignatieff, the Russian Minister President, having a large estate in the coal-mine district of the Donetz Valley, a fresh spurt is anticipated in the Russian coal trade. This may rest upon no foundation, but it has had the effect of stimulating the flagging spirits of Russian speculators in coal mines, and has reacted in a measure upon capitalists at Berlin and Paris. At the latter place a telegram to the *Novosti* a day or two ago states that a company has been formed there under the auspices of M. Novoselsky, to work the iron and coal mines on the estate of M. Antseroff, in the province of Orel. As the capital is fixed at 50,000,000 francs, or over \$10,000,000, the enterprise promises to be a big affair. On a smaller scale is a company that is being formed at St. Petersburg, with a capital of 500,000 roubles, or \$300,000, to work two groups of coal and iron mines; one at Ivanovsky, in the province of Ekaterinofsky, and the other in Khrustalevsky, in the country of the Don Cossacks. The present proprietor of the latter is Mr. Brodsky, the millionaire Jew at Kieff, whose costly mansion there was recently wrecked during the anti-Jewish disturbances. Another enterprise on foot is the conversion of Putiloff's iron works, St. Petersburg, into a French joint-stock concern. The works are the largest in Russia, and have employed as many as 8000 men at a time. Putiloff, who died a millionaire a year ago, may be said to have established iron rail making in Russia. Since his death the works have not been well conducted, but it is thought they will revive under fresh management. The moment is not a very auspicious one for introducing foreign capital into Russia, but the French have a mania just now for Russian enterprises, and hence every week some fresh scheme or other starts into existence at Paris for taking over a decrepit Russian concern and working it up into a profitable undertaking. In most cases the French shareholders will probably lose their money.

As a matter of fact, the iron trade in Russia is in a very bad way, and the coal trade is not much better. Take the leading engineering firms at St. Petersburg, for instance, where things are brighter than in the interior, and the state of trade may be tolerably well gauged:

	Usual number of workmen.	Present number.
Baird's Iron Works.	4,000	900
Sannikov's Iron Works.	1,400	500
Nobel's Iron Works.	1,200	600
Alexandrovsky Iron Works.	800	150

At seven other establishments there has been a similar reduction of hands, and at the Cronstadt dockyard two-thirds of the dockyard employees have received their discharge. The general cry is that there is no business stirring anywhere, and that, owing to the political condition of the country, enterprise is at a standstill. That this outcry rests upon a tolerably good basis, is shown by some returns just issued of the new enterprises floated in Russia in 1880. Throughout the year only seven new companies were started, the aggregate of their capital being \$16,600,000. More companies than this, with a considerably larger capital, are started in London every week of the year. The comparison is all the more significant if we remember that these seven new joint stock companies referred to the whole of Russia—the entire empire. At the present moment the aggregate number of public companies in Russia is only 544, which comprises 48 banks, 27 insurance companies, 47 railway companies, 50 steamboat companies and 372 industrial enterprises of various kinds. Such statistics enable one to realize the industrial backwardness of Russia better than whole columns of assertions. There being, really speaking, no enterprise whatever (in comparison with other countries) in Russia just now, the iron trade suffers in common with other countries, and has in front of it prospects of the most gloomy description.

One thing is largely responsible for this state of affairs—Russia is building no railroads. She has in hand, it is true, the little line across the Transcaucasian desert to Kezil Arvat, and a small link joining Baku on the Caspian, with the Caucasian town of Tiflis, but in Russia itself nothing is being constructed except an insignificant branch line here and there. Last year the aggregate of the additions to the Russian railway system did not exceed 700 miles—in the United States the total during the same period was 7207 miles. This is a difference with a vengeance. When it is considered that Russia and America are competing fiercely for the corn market of Europe, the odds against the Russian peasant through the non-construction of new railways are becoming enormous. Every day sees him less able to compete with the American, and in a few years we may probably see Russian corn driven out of every European market, in which case Russia will stand a good chance of becoming bankrupt. The total mileage of railways in Russia is only 15,000 miles, as compared with 93,704 in the United States. If Russia does not make proportionate progress, in a few years time she will have a less mileage of railways than either India, Australia, Canada or the Cape. The great drawback to the development of railways in Russia is the fact that the existing ones hang like a millstone round her neck. When the late Czar came to the throne there was only one railway in Russia, running from

St. Petersburg to Moscow, a matter of 450 miles. Alexander II started vigorously to repair the remissness of Nicholas, but he proceeded on a wrong basis. All his lines were constructed for military purposes, that Russia might invade Turkey, Austria or Germany with as much facility as possible. No attention was paid to commercial interests, and, for the sake of shortening the distances, not the slightest curve was made to take in the towns en route. The consequence is that there is hardly a line in Russia which does not have a heavy deficit at the end of the year, which, with the guaranteed interest, has to be made good by the state. Instead of developing Russia, the railways constructed have actually retarded her progress. Through their annual deficit, they occasion such a drain upon the national exchequer that the government has no funds left to construct fresh lines to open up the districts most in need of railways. In this manner Russia is paying heavily for the aggressive policy of the late emperor.

Horizontal Tubular Boilers.

In the *Locomotive*, published by the Hartford Steam Boiler Inspection and Insurance Company, we find the following:

In the early history of the horizontal tubular boiler, it was regarded necessary to crowd as many tubes as possible into the lower half, especial care being taken to put them in after the plan known as "staggered," because more tubes could be inserted and all the room economically occupied. Little regard was paid to the spaces between the tubes and shell, or to the distance of the tubes to each other. The question of the circulation seems to have been little thought of, and almost no regard was paid to facilities for inspecting and cleaning. The tubes used were usually 2 inches and 2 1/2 inches in diameter. They were packed so closely together that after a year or two the spaces became filled with deposits of lime and mud, and their efficiency was greatly impaired. In time, 3-inch tubes were introduced, but the manner of setting them was not changed. When the Hartford Steam Boiler Insurance Company first began business this was the condition of things mainly, and we at once set ourselves at work to influence, if possible, a change in this practice. Our aim was to have the tubes not less than 3 inches in diameter, and to have them arranged in vertical and horizontal rows, and not in any case nearer than 3 inches to the shell of the boiler. This, of course, reduced the number of tubes, and consequently the calculated heating surface of the boiler, and was bitterly opposed by many boiler makers. The rapid increase in manufacturing and consequent increase in the use of steam demanded important changes in the methods of constructing boilers, but the old prejudices lingered, and gave way only under severe pressure. A manufacturer wanted a new boiler of a certain horse-power. He would apply to two or more boiler makers for estimates of cost. They would make up their specifications accompanied with the estimated cost. On examination it would be found that their specifications agreed only in length and diameter. One would be crowded with tubes, while the other would have them well arranged and judiciously distributed. The former would claim greater efficiency because his boiler had more tubes, and, consequently, more heating surface, while the latter would contend that his boiler was superior because it provided for free circulation of the water. There was great difference of opinion among boiler makers on this point, and there seemed to be no well-established authority on the subject. Again and again we were applied to as umpire in such cases, and without reference to workmanship, which would be equally good in both cases, we believe, we invariably advised the tubes to be set in vertical and horizontal rows, well distributed, and in no case nearer than 3 inches to the shell. At the bottom we advised at least a distance of 6 inches in the smaller boilers, and 8 inches in the larger ones, for abundant room to adjust the hand holes—one in each end of the boiler—and to give a larger body of water over the fire, which is the hottest part. This was a great improvement on the old practice and came to be very generally adopted, and is largely the practice to-day, particularly in the East.

But experience raised the question some time ago as to whether this plan could not be improved upon? Were the tubes equally efficacious? It was found that the levity of the heated gases naturally carried them to the upper rows of tubes and the lower ones consequently did comparatively little work. The question then arose how many tubes can be removed and the maximum efficiency of the boiler maintained? Another was, as to whether the size of the tubes should be increased? We have experimented more or less in this field, and, to say the least, favor a reasonable departure in this direction. We have furnished many specifications for boilers constructed on this plan, and they have given good results. Boiler makers in many parts of the country are constructing boilers on this plan.

Over the center of the bottom there should be a distance of 18 inches from tubes to shell. This gives space for a good solid body of water over the fire, besides allowing room for a manhole in the front head underneath the tubes. The latter arrangement greatly facilitates the work of inspection. The entire bottom of the boiler can be inspected internally and externally, and sediment can be easily removed.

Some very wild statements have been made of late in regard to the Channel Tunnel scheme, based chiefly on the talk of Sir Edward Watkin before a recent meeting of the shareholders of the Southeastern Railway. It seems that that gentleman is convinced that the tunnel can be put through in five years, and that no trouble will be encountered from water. He bases this exceedingly sanguine view of the matter upon the fact that in driving an experimental gallery through the chalk with the Brunton machine, an advance of 67 yards had been obtained in a 7-foot heading, and that during the excavation no serious quantity of water had been met. This result may be very flattering, but it does not by any means justify the conclusion that because 67 yards had

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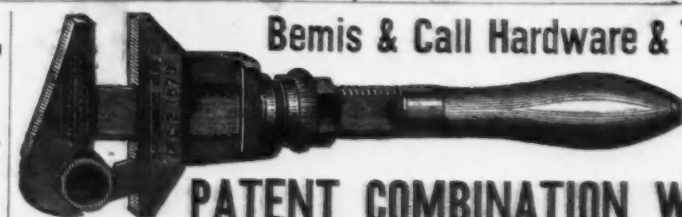
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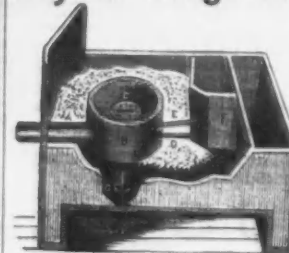
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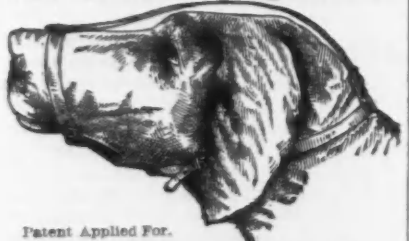
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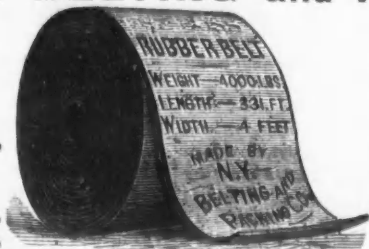
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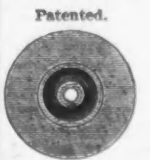
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been made in a short gallery, two miles could
be made in one year, and ten, one-half the
distance across the Channel, in four years.
Nor does the absence of water prove that
there is no fissure in the chalk under the
Channel through which an inconveniently
large volume of sea water might flow. The
difficulty of transportation of materials and
debris, of ventilation, &c., increase at an
enormous rate with an elongation of a tun-
nel, as experience in the Mont Cenis, St.
Gothard, Hoosac and other enterprises has
fully proven. It will take much more time
and very much more money than any esti-
mate of expenditure based upon a small ex-
perimental driving of a 7-foot heading would
yield. With unlimited funds and ample
time the Channel tunnel might be built, but
it is extremely doubtful whether it would
ever pay.

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We show in the accompanying illustration
an improvement in whiffletrees, which will
commend itself to all who have had expe-
rience in heavy trucking. It is made by the
American Car Starter Company, at Wil-
liamsport, Pa. The spring is made of the
best steel, and will carry from 5,000 to 12,000
pounds. The main section of the spring is
in two parts, this construction having been
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It has been for the past six months practi-
cally tested in this city in heavy trucking
service, and has given excellent satisfaction,
easing the horses and enabling them to move
heavier loads with less fatigue than would be
possible if the draft came on a solid bolt.
With this whiffletree there are no jerks or



lurches, and, when the horses are started,
the vehicle responds before the spring has
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The Lay-Haight Torpedo Boat.

English and other naval officials have
ridiculed the idea that a torpedo boat can be
propelled at a high rate of speed by car-
bonic acid gas unless some chemical means
be employed for heating the gas. That it
can be done was demonstrated recently by
the Lay-Haight boat. The Whitehead boat
is started from the shore by being shot from
a tube, and can only be used for short dis-
tances, say from 100 to 500 yards, making,
however, from 18 to 22 miles an hour. The
English experts told Mr. H. D. Windsor, of
New York, who, with Mr. George E. Haight,
of Hartford, owns the Lay-Haight improve-
ments, that the controllable torpedo is too
slow; that vessels of ordinary speed could
readily keep out of the way, or small boats
might be able to head it off. But these ob-
jections have been met by the Lay-Haight
torpedo, which during recent trials at New-
port has attained a speed of from 10 to 12
miles an hour. This has been obtained by a
new method of expanding the gas in the
pipes exposed to the sea water. The liquid
is taken from the flask into a series of pipes
running parallel with the torpedo boat, and
which are exposed to the sea water. The
electrical apparatus is quite simple and con-
sists of the key-board on shore, with a pecu-
liar arrangement of buttons which enables
the operator to stop, start, port, starboard
and fire by the mere touch of one of the but-
tons. These different functions are per-
formed through a single wire. By means of
a weak current the operator brings his key-
board in unison with the transmitter on
board the torpedo. With the aid of an in-
creased current the throttle is opened or
closed as desired, and by a still stronger
current, the extent of which is at all times
controllable by the operator, the torpedo is
fired either by contact or at will. The
explosion is made more complete by the
absence of all complications, such as large
magnets, shunts and other electrical devices.

The machinery of the new boat consists
only of the engine and a straight, hollow
screw shaft, which is attached to one of
Herschhoff's wheels. The boat may be
launched upside down or dropped from a
distance without disturbing any of the
mechanism. The boat is in three sections,
the forward part containing the explosive,
the middle section the reservoir or flask, and
the after section the cable, engine and elec-
trical apparatus, all of which can be put
together in half an hour's time. The cable
may be increased in length from half a mile
to a mile and a half, as desired, the opera-
tion of the torpedo being equally effective at
both distances. In operating the Lay boat
from three to five wires have heretofore
been used. The Lay-Haight is operated by
only one, as stated, by the increasing of the
current at will and by a simple contrivance
for bringing the function, such as stopping,
starting, &c., in direct unison with the key-
board. The boat is to be known as the Lay-
Haight torpedo. She is 23 feet in length,
19 inches in diameter, and the length of the
cable is one mile. She carries explosives
weighing 150 pounds, and is entirely con-
trolled by electricity. The motor—carbonic
acid gas—is contained in a flask which forms
part of the hull. One great improvement
over the Lay boat is the reduction in the
size, this boat being about one-half the
weight, or 1,000 pounds. For use on ship-
board and small launches a smaller boat has
been constructed, weighing only 500 pounds,
but it carries the same weight of explosive.

The United States District Attorney for
Southern New York does not approve of the
proposed arrest of Collector Merritt, on com-
plaint of Alexandre & Co., for the detention
of their steamer on account of alleged smug-
gling. In a letter to United States Commis-
sioner Shields he says: Collector Merritt
in this case has not willfully neglected to do
or perform any act. I find, on careful exami-
nation, that he has acted under an interpre-
tation of the law furnished him by the
Treasury Department, which was approved
by the Attorney-General of the United

States. Mr. Alexandre's remedy against the
collector, if the former has suffered any
wrong at the hands of the latter, is by civil
and not criminal proceedings.

American Iron Steamships.

The American iron steamship yards are
all prospering, being well occupied, and they
are turning out good work. This is true of
shipyards at Wyandotte and other points on
the Western lakes and rivers, as well as on
the Atlantic coast. Some of the iron steam-
ers recently put afloat for lake navigation
would compare well in size and equipment
with first-class ocean steamers. One of the
new features at Detroit is the construction
of immense iron pontoon hydraulic lift
docks, capable of taking up vessels 400 feet
in length and 60 feet wide. Large works
are also under way in the iron shipyards at
Cleveland, where orders are waiting execu-
tion. Among specimens of lately finished
work on the seaboard, we may point with
pride to the boats built by Messrs. Roach
and Cramp for the Iron Steamboat Com-
pany, and which now daily grace the waters of
New York Bay, carrying thousands of
excursionists. In general appearance they
are scarcely distinguishable from the wooden
steamers formerly built, excepting in their
evident lightness and celerity of movement.

It is pleasing to know that two more
superb iron steamers are to be added to the
four already running in Ward's Havana
line, Mr. Roach being already engaged in
laying the keels. These two will closely
resemble the Newport in size, appearance
and speed. As Ward & Co. now carry the

palm for speed—although Messrs. F. Alex-
andre & Sons follow closely in their wake,
and will shortly have another fine iron ves-
sel afloat—these frequent additions to the
American ocean fleet indicate the dawning
of a better day for our domestic mercantile
marinae. Only a few days ago we noticed
the appearance of a fine iron steamer from
Philadelphia builders, to ply between New
York and Venezuela. Another very credit-
able specimen for Mexican parties, built at
the Pioneer Iron Works, at Marcus Hook, is
nearly ready for her destination. It has
been well said that American shipping
should be as free from taxation as govern-
ment bonds. Under such auspices our
builders might defy competition.

The East River Bridge Approaches.

The Senate on the 8th inst. passed the bill
relative to the Brooklyn Bridge in the fol-
lowing shape:

AN ACT to improve the approach to the New
York and Brooklyn Bridge in the city of
Brooklyn.

Sec. 1. The trustees of the New York and
Brooklyn Bridge are hereby authorized and
required to take measures to acquire such
lands at the termination of the said bridge
in the city of Brooklyn as they shall deem
proper and necessary for the proper access
and approach to and use of the said bridge,
and for that purpose shall take such pro-
ceedings as are enacted for the acquisition
of lands for the construction of the said
bridge in and by the statutes heretofore
passed in relation to the said bridge. And
for the purpose of defraying the expense of
such measures there is appropriated the sum
of \$500,000. And it shall be the duty of the
Controller of the said city, and he is hereby
authorized, to borrow from time to time as
shall be requisite, upon the faith and credit
of the city of Brooklyn, the moneys neces-
sary to pay to the said trustees the sum
aforesaid, and to issue the bonds of said
city therefor, which bonds shall be signed
by the Mayor and Controller of the said city
for the money so to be borrowed, with such
interest as they shall determine, payable
half yearly, and which bonds shall be
redeemable in such time or times as they
shall deem proper.

Sec. 2. The said trustees are hereby
authorized to regulate the lands so to be
acquired by them, and also the streets ad-
joining thereto, and to cause all railroad
tracks upon the said streets adjoining the
said termination to be located and relaid in
a proper place, but not upon any of the
lands required under the provisions of this
act.

This act shall take effect immediately.

The first annual report of the relief
association organized by the Baltimore and Ohio
Railroad Company for the benefit of its em-
ployees, has been made by the manager, Dr.
W. T. Barnard. The association was inaugu-
rated a year ago, and embraces the fea-
tures of life and accident insurance, weekly
allowances and annuities. The railroad
company donated \$100,000 and agreed to
bear all expenses of the management, so
that all receipts are returned to members in
the form of benefits. The company also
allow half rates to members and their fami-
lies traveling over the road. The association
now has a membership of 14,139. During
the year 4167 claims were paid and 505 doc-
tors' bills, aggregating a total payment of
\$559,933 on account of deaths, accidents,
and sickness for the year. The report con-
tains an analysis of causes of accidents—a
matter of special interest to all railroad men,
as this is the first movement of the kind.
The railroad company maintain that their
outlay for the organization and maintenance
of the association is more than compensated
by the avoidance of lawsuits with employees
who suffer in the railroad service, and that
employees render better service, being
assured of being well cared for in case of
injury, or having their families provided for
in case of death.

The Mexican budget for the present finan-
cial year amounts to \$25,220,165. With
railroad obligations already amounting to
\$4,000,000 per annum, and regular deficits
for the past 20 years, how long before Mex-
ico will default on her promised subsidies to
railroad corporations, made with so much
freedom?

H. D. SMITH & CO.,

Plantville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

SARANAC HORSE NAIL CO.

Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

S. P. BOWEN, President and Treasurer.

PLATTSBURG, N. Y.

W. S. GUIBORD, Secretary.

ELY & WILLIAMS, Gen'l Agents for Eastern and Middle States, 1232 Market St., Philadelphia; 178½ Water St., New York; 36 Oliver Street, Boston. S. H. & E. Y MOORE, Gen'l Agents for Western States, 163 and 165 Lake Street, Chicago, Ill.

SAM'L G. B. COOK & CO., Agents for Southern States Nos. 67 and 69 (old Nos. 5 and 7) German Street, Baltimore, Md.

SARANAC HORSE NAILS,
Blued or Polished.
Terms, Cash, within 60 Days.
Nos. 5 6 7 8 9 10
Cts. 26 23 21 20 19 18

HARTLEY & GRAHAM, 17 & 19 Maiden Lane, NEW YORK,

Agents for the "ROBIN HOOD" REVOLVERS.

STEEL BARREL AND CYLINDER.

22, 32, 38 and 41 CALIBRE.

Cal., Short or Long Cylinder.

Wood, Rubber, Ivory and Pearl Handles.

Plain or Fluted Cylinders.

Round or Octagon Barrels.

Plain Finish, Engraved or Enameled.

FOR JOBBING TRADE.



ROBIN HOOD No. 1, 22 Cal.

32 Cal. Long Fluted Cylinder.

Wood, Rubber, Ivory or Pearl Handles.

Round or Octagon Barrels.

Plain or Saw Handle.

Plain Finish, Engraved or Enameled.

FOR JOBBING TRADE.

WM. ESTERBROOK,
Wholesale Manufacturer of
Coal Hods,
311 Cherry St., PHILADELPHIA.

"BARTLETT" FAMILY PRESS,
With Cloth
Strainer.
A Combined Meat
and Jelly Press.
Size, 6x9x4 in.
deep.
Price, per doz.,
\$12.

Special terms to manufacturers of tinware.
S. R. Bartlett, 235 Harrison St., Brooklyn, N.Y.

Romer & Co.
Established 1837.
Manufacturers of Patent Scandinavian or Jail
Locks, Brass Pad Locks for Railroads and Switches.
Also Patent Stationary R. R. Car Door Locks.
HANDCUFFS AND LANTERNS.
141 to 145 Railroad Avenue, NEWARK, N. J.
Illustrated Catalogue sent to the trade on application.

AXLES
All kinds Wagon & Carriage Axles
Manufactured by the
LAMBERTVILLE IRON WORKS.
Lambertville, N.J.
Send for prices.

The Boss Lemon Squeezer.

Malleable Iron and

Tinned (pure Tin).



Acknowledged the Best.

Patent Applied For.

JOHN J. TOWER, 96 Chambers St., New York.

ORDER EARLY.

FOR SCREEN DOORS.

Try the new combination.

**LATEST AND BEST,
GEER'S SPRING BUTTS WITH OUR
NEW BLANK BUTT.**

The most effective of all Butts in the market, on a
principle the reverse of all others, exerting their
greatest power when the door is closed.

REDUCTION IN PRICE.
Spring and Blank Butts for all sized doors.
For further information send for circular.

Manufactured by
THE COWLES HARDWARE CO., Unionville Conn., U.S.A.

SOAPSTONE FACINGS FOR FOUNDRIES,

And TALC for Manufacturers of Paper and Rubber Goods.

JOHN G. PORTER, 405 Pearl Street, N. Y.
Agent for A. B. FREEMAN & SON.

**CHAMPION
HOG RINGER
RINGS AND HOLDER.**

Only double Ring ever
invented. The only
Ring that will effectu-
ally keep Hogs from
rooting. No sharp
points in the nose.



**EAGLE BILL
CORN HUSKER**
Is the best Husker in the
market. Farmers say it
is the best. Use no other.



**BROWN'S
HOG AND PIG
RINGER AND RINGS.**
Only single Ring in
the market that closes
on the outside of the
nose. No sharp points
in the nose to keep it
sore.

Rings 75c. Rings, 50c. 100. Holders, 75c. Huskers, 15c.
CHAMBERS, BEHRING & QUINLAN, Exclusive Manufacturers, Decatur, Ill.

Bemis & Call Hardware & Tool Co.



PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened
throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches,
but also all requisite combinations of a regular Nut Wrench, thus making a combination which has no
equal.

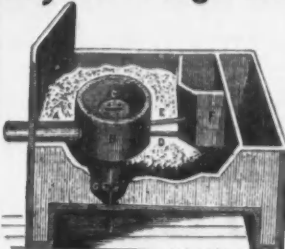
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BROWER & LEEDS, 81 Murray Street, New York,

SOLE AGENTS IN THE UNITED STATES FOR

Bayliss' Forge and Tuyere and Hurricane Bellows.



This Tuyere, either with or without water, will heat iron quicker,
better and will last longer than any tuyere now made. Brewster
& Co., of Broome St., have 50 of them. They cost but little more
than the common tuyeres. The HURRICANE BELLOW comes
ready for work. A 30-inch Hurricane Bellows is equal to a 40-inch
pear-shaped bellows, costs less and works with half the labor.
They are perfect and warranted.

JOHN BAYLISS, Esq., 150 E. 54th St., New York City.—Dear Sir: Yours
of the 11th inst. is at hand and contents noted. We can say that in
our smith shop (one of the very best equipped in the United States)
we have about 50 of your Tuyeres in use, and we consider them the
best Tuyere irons with which we have acquaintance.
Yours very truly,
PETER'S DASH CO.

**JOHN BAYLISS, Patentee and Mnfr.,
STAMFORD, CONN.**



THE BUTLER DOOR AND GATE SPRING.

Adjustable, Reversible, Self-locking. Has no Loose
Piece. Needs no Wrench. Acknowledged the
Simplest and Best Made.

BUTLER DOOR SPRING CO., Cleveland, Ohio.

BROWER & LEEDS, 81 Murray St., New York Agents.

HORACE F. SISE, 100 Chambers St.,

THE "BOSS" SCYTHE RIFLE.
Warranted not to scale or glaze. Impervious to water, and not affected by heat. It is the best Rifle now
offered.
LEVI L. BROOKS, Manufacturer,
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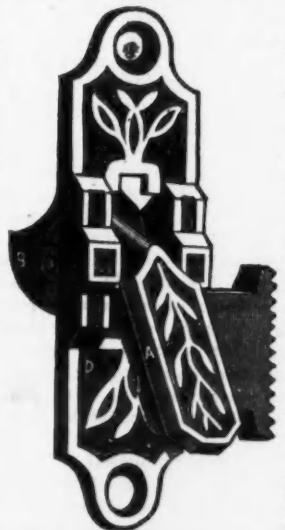
SPENCER & UNDERHILL,

94 Chambers St., New York, Agents for
American Screw Co.'s Wood Machine and
Rail Screws, Stove and Tire Belts, Rivets, &c.
G. F. Warner & Co.'s Carriage Clamps.

DEPOT FOR

O. Ames & Son's Shovels, Spades and Scoops.
A. Field & Son's Tacks, Nails, &c.
Nicholson File Co.'s Files and Rasps.
W. & S. Butcher's Chisels, Gouges, Plane
Irons and Cleavers.
E. W. Gilmore & Co.'s Strap and T Hinges.
Russell Jennings' Auger and Dowel Bits.
Also a general assortment of Hardware.

STRONG'S UNIVERSAL SASH-LOCK



Secures the Window perfectly in any position.
Burglar proof. The wind cannot rattle the windows.

Is attached to the Sash easily, without in the
least weakening or defacing it. No holes to be
cut in casings, no attachments thereto, no abra-
sion no matter how long used, nor how severely.
Is never out of order. Address

Universal Sash-Lock Co.,

5. W corner Hamilton and Liberty Streets,
ALBANY, N. Y.

N. Y. MALLET AND HANDLE WORKS



Manufacturers of
Calipers, Carpenters', Stone Cutters',
Tin, Copper and Boiler Makers'
MALLETS,

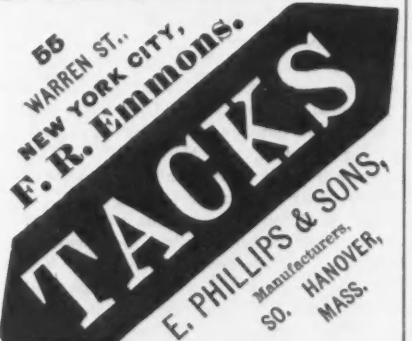
Hawking Beets, Hawking and Calking Irons;
also all kinds of Handles, Sledge, Chisel and Ham-
mer Handles. Also

COTTON AND RALE HOOKS.
Patented Feb. 15, 1877; a new combination of Hooks.
436 E. Houston St., New York City.

The Perfect Fit Dog Muzzle.



Patent Applied For.
THE MEDFORD FANCY GOODS CO.,
DOG COLLARS & FURNISHINGS,
98 Duane Street, New York.
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Manufacturers of
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Vulcanized Rubber Fabrics

ADAPTED TO
MECHANICAL PURPOSES.
RUBBER BELTING and PACKING.

Machine Belting,
Steam Packing,
Leading Hose,
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Belting,
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Piston Rod
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Vacuum Pump
Valves,
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Car Springs,
Wagon Springs,
Gas Tubing,
Machine Belting,
Wringer Rolls,
Billiard Cushions,
Grain Drill Tubes,
Emery Wheels.

This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham
Elevators at Chicago, which have been running perfectly for more than Twelve Years, also those for
Armour, Dole & Co., Chicago, and Vanderbilt's great elevators of the New York Central and Hudson R.
R. E. New York, being the Largest Belts in the World! We are now making an Elevator Belt 36
inches wide and 200 feet in length, which will weigh over 4,000 pounds.

LINEN and COTTON HOSE.



Plain and Rubber Lined.

Circular Woven-Seamless Antiseptic RUBBER
LINED "CABLE" HOSE and "TEST"
HOSE, Vulcanized Para Rubber and Carbolized Duck,
for the use of Steam and Hand Fire Engines, Force
Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c



"TEST" HOSE.

"CABLE" ANTISEPTIC

Emery Wheels and Packing.



Patented.
Solid Vulcanite
EMERY WHEELS
LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED



The properties of these Wheels are such that they can be used with great advantage and economy
for cutting, grinding, and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble,
Glass, etc. These wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools,
Plows, Saws, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small
Machinery of almost every description.

Pat. Jan. 25, 1865.

PATENT ELASTIC
Rubber Back Square Packing

BEST IN THE WORLD.
For Packing the Piston Rods & Valve Stems of Steam Engines & Pumps
B represents that part of the packing which, when in use, is in contact with the Piston rod.
A the elastic back which keeps the part B against the rod with sufficient pressure to be steam tight,
and yet creates but little friction.
This Packing is made in lengths of about 25 feet, and of all sizes from 1/4 to 2 inches square.

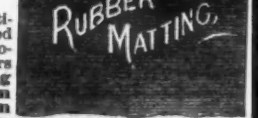
Corrugated Rubber Mats and Matting,

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For Halls, Flooring, Stone and
Iron Stairways, &c.



This practical and indispensable arti-
cle—especially for wear where exposed
to ice, snow or slush—was first intro-
duced by this company several years
ago, and its real value is in being
almost indestructible, when
proper materials are used in
its manufacture, whilst the cheap
inferior quality forced on the public by reckless imitators of our patent goods soon
and crumbles to pieces. Address



NEW YORK BELTING & PACKING CO.,
Warehouse, 37 and 38 Park Row, New York.
JOHN H. CHEEVER, Treasurer.

TACKS & NAILS.

CUT TACKS, SHOE NAILS, WIRE NAILS,
Pat. Brads, Finishing Nails, Clout Nails, Trunk Nails, Hungarian Nails,
Cigar-Box Nails, Basket Nails, 2d and 3d Fine Nails,
Carpet Tacks, Upholsterers' Tacks, Gimp and Lace Tacks, Brush
Tacks, Copper and Brass Tacks,
BRASS AND IRON ESCUTCHEON PINS, &c., &c.

MANUFACTURED BY
DUNBAR, HOBART & WHIDDEN, So. Abington Station, Mass.
New York Salesroom, 39 Warren St. Goods made to order from sample.
Particular attention given to orders for EXPORT.

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The Phosphor-Bronze Smelting Co.,
Limited,

Owners of the
U. S. TRADE MARKS: Sole
Phosphor Manufacturers
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Bronze Patents. "Phosphor-Bronze." in the
United States.

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THE STRONGEST, TOUGHEST,
BEST AND MOST DURABLE METAL.

PHOSPHOR BRONZE SPRING WIRE AND WIRE FOR WEAVING, &c.
Pump Rods, Tubes, Screws, Jack Chains,
Rolled Bolts, Nails, Wire Cloth, Sash Cords,
Sheets, Boat Nails, Pens, Wire Ropes,
Plates, Tacks, Sash Chains, Cast Kettles.

INGOTS FOR CASTING.
Send for Pamphlet and Price Lists.
PHOSPHOR-BRONZE.

been made in a short gallery, two miles could
be made in one year, and ten, one-half the
distance across the Channel, in four years.
Nor does the absence of water prove that
there is no fissure in the chalk under the
Channel through which an inconveniently
large volume of sea water might flow. The
difficulty of transportation of materials and
debris, of ventilation, &c., increase at an
enormous rate with an elongation of a tun-
nel, as experience in the Mont Cenis, St.
Gotthard, Hoosac and other enterprises has
fully proven. It will take much more time
and very much more money than any esti-
mate of expenditure based upon a small ex-
perimental driving of a 7-foot heading would
yield. With unlimited funds and ample
time the Channel tunnel might be built, but
it is extremely doubtful whether it would
ever pay.

Hill's Spring Whiffletree.

We show in the accompanying illustration
an improvement in whiffletrees, which will
commend itself to all who have had expe-
rience in heavy trucking. It is made by the
American Car Starter Company, at Wil-
liamsport, Pa. The spring is made of the
best steel, and will carry from 5000 to 12,000
pounds. The main section of the spring is
in two parts, this construction having been
adopted to avoid the tendency to breakage.
It has been for the past six months practi-
cally tested in this city in heavy trucking
service, and has given excellent satisfaction,
easing the horses and enabling them to move
heavier loads with less fatigue than would be
possible if the draft came on a solid bolt.
With this whiffletree there are no jerks or



lurches, and, when the horses are started,
the vehicle responds before the spring has
been compressed to the limit of its play. Mr.
B. F. Turner, Williamsport, and 938 Seventh
avenue, New York, is general agent for the
United States.

The Lay-Haight Torpedo Boat.

English and other naval officials have
ridiculed the idea that a torpedo boat can be
propelled at a high rate of speed by car-
bonic acid gas unless some chemical means
be employed for heating the gas. That it
can be done was demonstrated recently by
the Lay-Haight boat. The Whitehead boat
is started from the shore by being shot from
a tube, and can only be used for short dis-
tances, say from 100 to 500 yards, making,
however, from 18 to 22 miles an hour. The
English experts told Mr. H. D. Windsor, of
New York, who, with Mr. George E. Haight,
of Hartford, owns the Lay-Haight improve-
ments, that the controllable torpedo is too
slow; that vessels of ordinary speed could
readily keep out of the way, or small boats
might be able to head it off. But these ob-
jections have been met by the Lay-Haight
torpedo, which during recent trials at New-
port has attained a speed of from 10 to 12
miles an hour. This has been obtained by a
new method of expanding the gas in the
pipes exposed to the sea water. The liquid
is taken from the flask into a series of pipes
running parallel with the torpedo boat, and
which are exposed to the sea water. The
electrical apparatus is quite simple and con-
sists of the key-board on shore, with a pecu-
liar arrangement of buttons which enables
the operator to stop, start, port, starboard
and fire by the mere touch of one of the but-
tons. These different functions are per-
formed through a single wire. By means of
a weak current the operator brings his key-
board in unison with the transmitter on
board the torpedo. With the aid of an in-
creased current the throttle is opened or
closed as desired, and by a still stronger
current, the extent of which is at all times
controllable by the operator, the torpedo is
fired either by contact or at will. The ex-
plosion is made more complete by the
absence of all complications, such as large
magnets, shunts and other electrical devices.

The machinery of the new boat consists
only of the engine and a straight, hollow
screw shaft, which is attached to one of
Herschhoff's wheels. The boat may be
launched upside down or dropped from a
distance without disturbing any of the
mechanism. The boat is in three sections,
the forward part containing the explosive,
the middle section the reservoir or flask, and
the after section the cable, engine and
electrical apparatus, all of which can be put
together in half an hour's time. The cable
may be increased in length from half a mile
to a mile and a half, as desired, the opera-
tion of the torpedo being equally effective at
both distances. In operating the Lay boat
from three to five wires have heretofore
been used. The Lay-Haight is operated by
only one, as stated, by the increasing of the
current at will and by a simple contrivance
for bringing the function, such as stopping,
starting, &c., in direct unison with the key-
board. The boat is to be known as the Lay-
Haight torpedo. She is 23 feet in length,
19 inches in diameter, and the length of the
cable is one mile. She carries explosives
weighing 150 pounds, and is entirely con-
trolled by electricity. The motor—carbonic
acid gas—is contained in a flask which forms
part of the hull. One great improvement
over the Lay boat is the reduction in the
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should be as free from taxation as govern-
ment bonds. Under such auspices our
builders might defy competition.

The East River Bridge Approaches.

The Senate on the 8th inst. passed the bill
relative to the Brooklyn Bridge in the fol-
lowing shape:

AN ACT to improve the approach to the New
York and Brooklyn Bridge in the city of
Brooklyn.

Sec. 1. The trustees of the New York and
Brooklyn Bridge are hereby authorized and
required to take measures to acquire such
lands at the termination of the said bridge
in the city of Brooklyn as they shall deem
proper and necessary for the proper access
and approach to and use of the said bridge,
and for that purpose shall take such pro-
ceedings as are enacted for the acquisition
of lands for the construction of the said
bridge in and by the statutes heretofore
passed in relation to the said bridge. And
for the purpose of defraying the expense of
such measures there is appropriated the sum
of \$500,000. And it shall be the duty of the
Controller of the said city, and he is hereby
authorized, to borrow from time to time as
shall be requisite, upon the faith and credit
of the city of Brooklyn, the moneys neces-
sary to pay to the said trustees the sum
aforesaid, and to issue the bonds of said
city therefor, which bonds shall be signed
by the Mayor and Controller of the said city
for the money so to be borrowed, with such
interest as they shall determine, payable
half yearly, and which bonds shall be
redeemable in such time or times as they
shall deem proper.

Sec. 2. The said trustees are hereby
authorized to regulate the lands so to be
acquired by them, and also the streets ad-
joining thereto, and to cause all railroad
tracks upon the said streets adjoining the
said termination to be located and relaid in
a proper place, but not upon any of the
lands required under the provisions of this
act.

This act shall take effect immediately.

The first annual report of the relief asso-
ciation organized by the Baltimore and Ohio
Railroad Company for the benefit of its em-
ployees, has been made by the manager, Dr.
W. T. Barnard. The association was inau-
gurated a year ago, and embraces the fea-
tures of life and accident insurance, weekly
allowances and annuities. The railroad
company donated \$100,000 and agreed to
bear all expenses of the management, so
that all receipts are returned to members in
the form of benefits. The company also
allow half rates to members and their fami-
lies traveling over the road. The association
now has a membership of 14,439. During
the year 4167 claims were paid and 505 doc-
tors' bills, aggregating a total payment of
\$5599.83 on account of deaths, accidents
and sickness for the year. The report con-
tains an analysis of causes of accidents—a
matter of special interest to all railroad men,
as this is the first movement of the kind.
The railroad company maintain that their
outlay for the organization and maintenance
of the association is more than compensated
by the avoidance of lawsuits with employees
who suffer in the railroad service, and that
employees render better service, being
assured of being well cared for in case of
injury, or having their families provided for
in case of death.

The Mexican budget for the present finan-
cial year amounts to \$25,220,168. With
railroad obligations already amounting to
\$4,000,000 per annum, and regular deficits
for the past 20 years, how long before Mex-
ico will default on her promised subsidies to
railroad corporations, made with so much
freedom?

The Iron Age

AND
Metallurgical Review.

New York, Thursday, July 14, 1881.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. BAYLES, Editor.
JOHN S. KING, Business Manager.

RATES OF SUBSCRIPTION INCLUDING POSTAGE.

THE UNITED STATES, BRITISH AMERICA AND
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Weekly Edition: \$4.50 a year.
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REMITTANCES
should be made by draft, payable to the order of David
Williams, on any banking house in the United States
or Europe; or, when a draft cannot be obtained, in
postage stamps of any country.

NEWSDEALERS OR BOOKSELLERS
in any part of the world may obtain *The Iron Age*
through the American News Company, New York, U.
S. A.; the Wilmer & Rogers News Company, New
York, U. S. A.; and London, England; or the San Fran-
cisco News Co., San Francisco, California, U. S. A.

RATES OF ADVERTISING.
One square (12 lines, one inch), one insertion, \$2.50;
one month, \$7.50; three months, \$15.00; six months,
\$25.00; one year, \$30.00; payable in advance.

DAVID WILLIAMS, Publisher,
53 Reade Street, New York.

PHILADELPHIA: 232 South Fourth Street
THOS. HOSKIN, Manager.

PITTSBURGH: 77 Fourth Avenue
JOS. D. WEEKS, Manager and Associate Editor.

CHICAGO: 35 & 36 Clark st., cor. Lake
HENRY SMITH, Manager.

CINCINNATI: Builders' Exchange
T. T. MOORE, Manager.

CHATTANOOGA: Eighth and Market Streets
S. B. LOWE, Manager.

BRITISH AGENCY.
The publishers of *The Iron Age*, 44 Cannon Street,
London, England, will receive orders for subscriptions
and advertisements on our regular terms.

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The lock of the Davis Island dam, which
the United States government is building
across the Ohio below Pittsburgh, is ap-
proaching completion. The lock walls are
finished, and the channel through them
has been dredged 19 feet below the
level of the river bed at that point. The
locks will be opened and the river allowed to
run through them, which will afford an
ample depth of water for all craft and re-
lieve the river at low water, so that work
can be prosecuted on the dam without hin-

drance, except when the water is high.
File driving for the foundation of the dam
will begin in a few days, and the first sec-
tion (500 feet) will soon be under way. The
lock of this dam is the largest in the world,
being designed to receive the enormous coal
tows that are so common on the upper Ohio.
The dam itself will have movable wickets,
that can be raised or lowered in low or high
water.

Condition of the Blast Furnaces of the United States, July 1, 1881.

We are again enabled to present our read-
ers with our usual quarterly statement of the
condition of the furnaces of the country. In
view of the reports that have been cur-
rent as to blowing out of furnaces, this is of
more than usual interest, and will indicate
not only to what extent furnaces have been
blown out in the last three months, but also
how they compare with other years. In order
to avoid any misunderstanding and to point
out exactly the scope of the table, the fol-
lowing explanations are given:

1. The divisions of the localities are geo-
graphical for the most part, and are not
made with reference to the points from
which furnace supplies are drawn. 2. The
columns "in blast" and "out of blast" only
show the stacks from which we have reports,
and their footings will not in every case equal
the footings of the column of total number. 3.
We have included some furnaces that are re-
building and not yet completed, and others
that are building, and in one or two cases
some furnaces that have been reported
abandoned, since their owners do not report
them. In other cases we have stricken from
our list furnaces that are generally included
in such lists, as we are assured that they
are permanently out. 4. The column of ca-
pacity per week is somewhat in excess of
what the regular working of the furnace
will show—stoppages, slow working and
various other causes, which will readily oc-
cur to those interested, combining to reduce
the make below the furnace capacity. On
the other hand, the capacity of many of the
furnaces has been constantly increasing for
the past few years, which makes the totals
of capacity vary from quarter to quarter.
In a condensed form the table shows the
following (I in blast; II out of blast):

CONDITION OF FURNACES JULY 1, 1881.

	I.	II.
Charcoal.....	147	135
Anthracite.....	140	29
Bituminous.....	144	77
Total.....	431	241

The condition of the furnaces the 1st of
each quarter the present year is as fol-
lows:

IN BLAST.				
	Jan. 1.	April 1.	July 1.	
Charcoal.....	160	139	147	
Anthracite.....	162	159	146	
Bituminous.....	151	155	144	
Total.....	473	453	437	
OUT OF BLAST.				

	Jan. 1.	April 1.	July 1.
Charcoal.....	112	132	125
Anthracite.....	76	80	90
Bituminous.....	63	64	77
Total.....	151	276	292

It will be noticed that there has been but

It will be noticed that there has been but
little change in the past six months in the
condition of the furnaces—less than 10 per
cent. The greatest change has been in
charcoal and anthracite furnaces, and the
east in bituminous, there being seven less on
July 1 than on January 1, and eleven less
than on April 1.

Another noticeable feature of this report
is the greater average capacity of bitumi-
nous furnaces shown: 146 anthracite fur-
naces have a capacity of 33,313 tons a week;
144 bituminous, 48,796 tons, or more than
one-third greater.

For the last five years the relative con-
dition of the furnaces on July 1 was as follows:

	1877.	1878.	1879.	1880.	1881.
Charcoal.....	87	64	81	131	147
Anthracite.....	87	95	101	157	146
Bituminous.....	85	89	95	115	144
Total.....	259	248	277	413	437

	1877.	1878.	1879.	1880.	1881.
Charcoal.....	181	202	179	136	125
Anthracite.....	139	130	125	68	90
Bituminous.....	123	128	107	109	77
Total.....	443	460	412	313	292

This table shows that the anthracite
furnace industry is in a worse condition
than a year ago, 21 furnaces more being out
of blast now than then, while of the bitumi-
nous furnaces 29 more are in. The causes of
this condition would furnish an interesting
article.

Some years ago a considerable number of
influential millers formed a national associa-
tion for the purpose of protecting and ad-
vancing common interests. Among other
matters they undertook to defend themselves
against the attacks of those who claimed to
possess patents for improvements in general
use, and accordingly fought with much suc-
cess the owners of what is known as the
Cochrane re-issue, expending considerable
amounts for legal services. All efforts to
induce outside parties to aid in carrying this
self-imposed burden failed, even though
threats were apparently made to accept a
compromise, and thus afford the holders of
the patent an opportunity to bring outsiders
to terms singly. At the recent meeting of
the association a compromise was finally
made for little more than a nominal sum,
though the courts had decided against the
patent. Professedly the members preferred
rather to pay than to run the risk, how-
ever small, of being defeated on appeal
with its attendant expense, but there seems

little doubt that their action was, at least
to some extent, prompted by a desire
to take revenge on those who were content
to see others fight their battles and watch
the issue of the struggle. There are few
who will sympathize with the latter party,
but it must be a source of regret to all to
see that such a motive should have aided in
determining business men to abandon an
apparently good cause. Such a proceeding
gives encouragement to a class of men who
base a regular system of frightening manu-
facturers into the payment of royalties upon
the liberality of our Patent Office in granting
its privileges, and the tendency of the courts
to sustain the so called "inventors" in all
but the most undisputed cases.

The Future of Copper.

For many years the copper trade in this
country has been in a peculiar condition.
The mines of Lake Superior, except in years
of unusual activity, have produced a surplus
of the metal which they have invariably sold
abroad at a price lower than it was held for
in this market, and in consequence of its
excellent quality it always found ready pur-
chasers there. We have no intention of
entering upon the question whether this was
a sound policy or not. Its effect was to
keep the market here at a figure correspond-
ing to the cost of importing foreign copper
with the duty added. With raw material of
unexampled tenacity, and by the use of
excellent machinery, our manufacturers suc-
ceeded in producing articles, notably car-
tridges, which found a market all the world
over. But they could only secure these im-
portant contracts by making arrangements
with the Lake companies for a heavy re-
duction in the price of the raw material.
Of late years, however, foreign govern-
ments have commenced to purchase Ameri-
can machinery, Lake copper and Lehigh
spelter, and the demand for our manu-
factured products has been falling off. But
within the last two months developments
have been made that give quite a different
aspect to the copper trade and the industries
dependent upon it, and a brief review of the
present condition of affairs and an examina-
tion of their prospective development deserve
the earnest consideration of those interested.

Unfortunately the statistical data concern-
ing the production of copper in the world are
not complete, but a study of the output of
the principal producing countries alone will
prove amply that the copper mines are pro-
ducing more metal than consumers are wil-
ling to take. The markets have been suffer-
ing from overproduction, in the sense that
increased supplies have been coming forward
steadily without a corresponding reduction
in the price, the result being an uninter-
rupted increase in the stocks. From the
latest statistics available we compile the
following table as the production of the
various countries of the world:

	Tons.
United States.....	39,000
Chile.....	45,000
Spain.....	35,000
Australia.....	8,000
Costa Rica.....	8,000
Germany.....	8,000
England.....	8,000
Italy and Austria.....	4,000
Other countries.....	3,000
Japan.....	3,000
Total.....	139,000

The stocks in England and France have
now reached the enormous total of 47,000
tons, and although a large portion of it has
been held for many years in very strong
hands, the indications that the load is get-
ting too heavy for the holders to stagger
under are becoming more numerous.

Such is the condition of the copper mar-
kets of the world, which the American pro-
ducers are about to enter, not as the sellers
of a surplus of metal at any price for the
purpose of being able to maintain prices at
home, but in order to reap a profit over cost
of production. The exports of Lake copper
from this country during the last ten years
have been as follows:

	Year.	Export. Lbs.	Reimport. Lbs.
1874.....	8,068,809	.....	.....
1875.....	6,842,250	.....	.....
1876.....	15,021,450	.....	.....
1877.....	14,448,464	.....	.....
1878.....	19,097,597	.....	.....
1879.....	13,731,215	2,442,416	.....
1880.....	2,150,713	2,150,713	.....
1881, to July 12.....	5,780,250	268,500	.....
Total.....	74,677,233	4,873,129	.....

Roughly, therefore, we have exported
37,000 tons of Lake copper during a period
of 7½ years.

It will be understood from the foregoing
that we have generally had a surplus, but
that this excess of production over con-
sumption was controlled virtually by one
party. This is now on the eve of being en-
tirely changed. Some months since we
called attention, in a brief note, to the
increasing importance of the copper mines
of Arizona, New Mexico and other Rocky
Mountain States. What was then cried
down as a phantom has now become a stern
reality. Although some months ago, in the
beginning of the season, the Lake companies
contracted in France for the delivery of
3000 tons of copper, which was supposed to
be the entire surplus stock, the price of
copper declined steadily, notwithstanding
the efforts made to hold it, in the face of a
confessedly good demand on the part of man-
ufacturers. There were frequent rumors of
outside lots of copper, and it was known
that larger quantities of metal were being
shipped from San Francisco to New York
dealers and manufacturers. A few weeks
ago it was learned that a large metal house
had contracted with the leading Western
mine for the delivery of their entire product

of the year, estimated at 2000 tons, and that
500 tons had already been turned out. The
price, which had been steady at 18½ cents
in the beginning of the month, declined
gradually to 16 cents, at which figure the
companies made the extraordinary move of
contracting for six months ahead for a large
quantity.

Let us examine the cause of this move-
ment. It has been known for a long time
that New Mexico and Arizona are excep-
tionally rich in copper ores, and that many
of the deposits of that region contain con-
siderable quantities of the precious metals
besides; but owing to the lack of transpor-
tation facilities, of capital, fuel, labor and
a knowledge of how to treat some ores, the
mines were neglected. It was not till the
middle of last year that attention was turned
to the subject, and that the building of the
Southern Pacific Railroad directed capital
and enterprise to that quarter. One mine—
the Copper Queen, of Bisbee—was opened,
and it has already made a remarkable
record, having shipped 880 tons of copper in
the first six months of the year. This was
the product of one furnace; a second one is
now erected and the capacity of the works
will thus be doubled. The ore is rich, contain-
ing 25 per cent. of copper, and, as is usual with
surface deposits, is pure and in a condition to
be reduced to metal without extended pro-
cesses of smelting. It is stated that the
copper can be laid down in this city for
about 8 cents a pound, notwithstanding the
fact that coke for smelting costs \$27 a ton
and freights and labor are high. Even if
this claim should not be borne out fully by
actual facts, there can be no doubt that the
owners of that particular mine are able to
compete with Lake Superior, even if the
latter should come down considerably below
the present export price, and that both
would find it possible to secure a market
abroad at rates which would yield some
profit. While the Lake mines have the advan-
tage of possessing an elaborate plant and are
well developed, with easy communication
with the markets, the Western mines are
favored by the fact that their ores are of
high grade, are much more easily mined and
are readily reduced. Some of the ores con-
tain silver also, but as yet it is doubtful
whether in most cases this would prove of
any value. In this direction, metallurgy
has long been deficient in methods, but the
fact that more attention is being paid to the
subject by eminent experts encourages the
belief that we are on the eve of important
improvements. Enough has been said, how-
ever, to show that the growing copper in-
dustry of the West cannot be crushed out
easily, and there are very strong indications
that no effort will be made to do so. On
Lake Superior the output of the smaller
mines, which might possibly go to the wall
during the decline, does not amount to more
than 10 per cent. of the total production,
and this would probably be made up by the
increased activity of the larger mines, who
would seek to earn big dividends by hand-
ling greater masses at a lower profit. While
we do not, therefore, look to any consider-
able reduction in the output, but expect
rather a notable increase, consumption will
expand, stimulated by a lower price.

The question whether that expansion of
consumption will keep pace with an in-
creased output, is one which will soon be
brought up. From present indications it
would seem that we will have a surplus of
metal. This ought not to go abroad in its
crude shape, but should be placed on the
markets of the world in a manufactured
state. If it is considered that the only cause
for our inability to sell brass and copper
goods abroad has been that our raw material
was too dear, it will be understood that as
soon as that drawback is removed we may
become strong competitors of Birmingham
and Paris. The machinery of our rolling mills
is, as a general thing, of modern and im-
proved patterns, and in many respects supe-
rior to that employed in any other country.
Its capacity is not alone fully up to our
own requirements, but considerably exceeds
them. It is chiefly in the manufacture of
brass and the thousand small articles made
from it that they excel, and as probably
nearly two-thirds of the copper consumed in
this country is absorbed by this trade, those
connected with it are principally interested.
Our manufacturers have, on the whole, no
reason to regret the changes which have
been wrought during the last few weeks,
nor is there any cause for apprehension in
the future. They should study the outlook
carefully and shape their course accord-
ingly. From all that we are able to gather,
that course seems to us to lie in the direc-
tion of an early development of an export
trade.

The facts in regard to the silly rumors
that have been going broadcast over the
country, to the effect that the Cincinnati
strike was inaugurated by the Pittsburgh
manufacturers, are coming to the surface.
We have said that we did not believe it. In
the same article we were on the point of
saying that we did not think the Cincinnati
manufacturers believed it, and from reliable
information that we have received the past
week we learn that this is the fact. The ori-
gin of the stories seems to be either the mis-
understanding or invention of some over-zeal-
ous reporter, who believed that it was his
duty to offer some explanation of things. To
show how little this intelligent reporter
knew of what he was discussing, he stated,
as knowing that Pittsburgh was at the
bottom of the strike, that in a month the

Pittsburgh mills had profited 2000 tons. Con-
ceding that they had, how little effect this
had on Pittsburgh will be seen when it is
known that this would be about the amount
turned out by the Pittsburgh mills in work-
ing one full double turn—that is, a good
day's work.

The Meaning of Quality Specifi- cations in Iron Contracts.

A case of considerable interest has just
been decided in England, involving the
question whether a manufacturer of iron, in
the absence of any stipulation to the con-
trary, is at liberty to fill a contract by
supplying iron made at other works than his
own. In 1879 a certain firm of manufac-
turers contracted to supply 2000 tons ship
plates, "Crown" quality. A few hundred
tons only were furnished when the works
were closed, and the manufacturers holding
the contract proposed to fill it with plates of
the same quality, but not of the same make.
The shipbuilders refused to receive the
plates. It was not stipulated in the con-
tract that the plates should be made by the
contracting firm, but the shipbuilders claimed
that it was understood that they were to be.
The contractors claimed that they were at
liberty to supply any plates of the same
quality. Lord Justice Bramwell held that
that there was a written contract between
the parties which did not contain any term
that the goods should be of the plaintiff's
make, and that no such term ought to be
implied, for, in his own opinion, the implied
meaning of the contract was that the goods
should be of any maker's make. In the first
trial the decision went this way, but in the
Court of Appeal two of the three judges
ruled that the contention of the defendants
(the shipbuilders) was right. If a person or-
dered goods direct from a firm who are man-
ufacturers only of such goods, no dealers
in them, then the purchasers must be as-
sumed to have contracted with that particu-
lar manufacturer in reliance on the general
excellence of the work of their firm, and
were entitled, in the absence of any express
stipulations to the contrary, to have that
manufacturer's own make. Lord Justice
Brett was of opinion that "when a man
held himself out to be a selling manufac-
turer of goods, and did not hold himself
out as being otherwise a dealer of such
goods, he held out to a proposing pur-
chaser that what he, the manufacturer,
offered to do on an order given to, or con-
tract otherwise made with him, or the
supply of goods such as he professed to
deal in, was that he would supply goods
"manufactured by himself." It is much to
be desired that an authoritative decision on
the point raised by this trial should be given,
because cases of this character are often
occurring. Customers would do well, in
future contracts, to leave nothing to be in-
ferred, but to add a clause to the effect that
goods supplied are to be of the manufac-
turer's own make, and then the expense of
legal proceedings on this score will be ob-
viated. We do not know of any similar case
in this country, but the decision would doubt-
less go a great way in deciding like cases
before our courts.

The Experimental Boiler Explosion at Pittsburgh.

One of the Western newspapers expresses
great indignation that we have not given
such honor to Mr. Lawson for his experi-
mental boiler explosion as it considers due
that gentleman. It states that we are ig-
norant of the man and the subject. Along with
the copy of the paper comes a little pam-
phlet written by Mr. Lawson, "patentee of
"means for preventing explosions of steam
"boilers." In other words, all this wonderful
experimenting, terminating in a single
boiler explosion, is for the purpose of selling
a patented explosive preventer which as yet
has not been tried. We do not accept this as
a scientific revelation, nor do we think it
strange that we are taken to task for our
course. Mr. Lawson, in his pamphlet, com-
plains of the government tests, and says that
one or two boilers were damaged by "enor-
mously high pressures." We would refresh
Mr. Lawson's memory by saying that a
genuine explosion, quite as destructive as
his own, took place with less than 60 pounds
of steam, while he found it necessary
to use 380 or more. The blowing up of
a boiler by the shock occasioned by a
sudden lowering of pressures and a conse-
quent conversion of a considerable quantity
of water into steam at a reduced pres-
sure, is apparently nothing new, as we
have said before. Within a few years
several boats near this city have exploded
from this cause, so far as can be ascertained.
For example, the Magenta, when leaving
Sing Sing, if we remember rightly, exploded
her boiler just after getting the "jingle"
to go ahead full speed as she got into deep
water. The Adelphi's boiler went out of
her side under similar conditions. The pilot
rang to go ahead as she was passing from
the river into the Sound. It is stated that
the boilers in both cases went up just after
the engineer had opened his throttle wide,
the engine having been working slow for
some time previously. Now, what happens
under such conditions? If we suppose a
body of water heated to a temperature
equivalent, say, to a steam pressure of 25
pounds and then reduced to 15, we shall
have sufficient heat in the water to convert
about .02 of the mass into steam. At the
reduced pressure this steam would occupy

about 14 times the space of the water itself. We quote Mr. Colburn's figures from memory. He says, in effect, that there may be many cases when this action may determine an explosion.

To invent such terms as "superheated water" and to talk of a "vacuum" in the steam space of a boiler is foolish, to say the least. And we think we may be pardoned if we do not see any great merit in the work done by the gentleman. The explosion about which so much has been said is a very insignificant affair, at least from Mr. Lawson's own standpoint, when compared with the second one which took place at Sandy Hook. Here the boiler had been tested the day before to 60 pounds, yet it exploded at 53½ pounds per square inch and went all to pieces. One mass of about 3 tons weight was thrown 450 feet, and in passing that distance went a long way up into the air. The committee say of it: "Almost the whole of the boiler was literally torn into shreds." Both tube sheets, so violent was the explosion, were torn from the tubes. The pieces were thrown in all directions, and one of the bomb-proofs was dislodged by the violence. Of the particulars of this explosion, in which only 13 minutes were occupied in raising the steam pressure from 29 to 53½ pounds in a boiler 12 feet wide, 15 feet long and 8 feet high, with 2518 feet of heating surface, Mr. Lawson appears to be profoundly ignorant. In this case the gentleman's apparatus or improvement could not have saved the boiler, unless it had added strength to the boiler shell. Of course, in the minds of some persons one of these explosions will weigh against the other, one proving one thing and the other something else. The first one was valuable, and Mr. Lawson may make his equally so. We should be glad to see him burst a large, weak boiler with 25 pounds of steam to the square inch. That it can be done we feel sure, and in the way he proposes. With a low pressure the experiment would be more conclusive than with the 380 pounds which he used. The latter was sufficient to have done the work without calling for the energy stored up in the water.

English and American Pumps.

Our recent article upon American and English pumps, published in our issue of June 2, has called out the following letter:

To the Editor of *The Iron Age*.—Sir: As you have thought fit to devote an article in your edition of June 2, under the heading of "American and English Pumps," for the purpose of attacking the statements made by us in a letter recently published in the *Ironmonger*, London, we must ask you, in common fairness, to allow us a few words in reply.

We will at the outset simply and fully endorse every statement contained in our former letter, and we are quite prepared to substantiate the following facts, viz.:

1. That American Pumps are more difficult of repair than those manufactured by us.
2. That American pumps are certainly not "the cheapest, most durable and efficient pumps made."
3. That our pumps, instead of weighing from 5 to 50 pounds heavier, are really a shade lighter than the American patterns, and will stand more wear and rough usage.
4. That the quality of iron used by ourselves is superior to that used by American pump makers; this is at once proved by comparing the castings comprising the respective pumps.

We have not in the above remarks spoken from mere assumption, but from practical knowledge, after having carefully examined and taken to pieces pumps made by all the leading American manufacturers and placed them side by side with those of our own make. Had you, sir, taken similar precautions your article would, most probably, have never appeared.

In conclusion, sir, we may add that we should speedily demonstrate in a practical manner to the American public and yourself the decided superiority of the English over American pumps if your manufacturers were not so conveniently sheltered behind the wall of protection.

Trusting you will insert this letter in your July 2 edition, I remain, sir, yours faithfully,
JOSEPH EVANS & SONS.

This letter deserves some reply from our American pump makers, and we should be glad to put it into their hands entirely. We think, however, that it is necessary for us to make some remarks upon certain statements utterly without foundation, and which it is hardly possible Messrs. Joseph Evans & Sons consider defensible. Upon the letter sheet on which this communication was written, there are seven forms of pumps illustrated. Of the seven, two are absolute copies in design of Douglass pumps. What departures there have been from the American patterns have been to increase the weight. These are hand pumps. In regard to the flange at protection, we wish to ask just one question of the Messrs. Evans. If what you say is true, why don't you keep these American pumps out of the English market? Just now large quantities of these same American hand pumps are being shipped by our manufacturers to their Liverpool agents. That these pumps are retailed in England is a sufficient answer to the wild remarks of our somewhat excited English friends. Not only do these gentlemen fail to keep American hand pumps out of England, but the same is true of Turkey, Australia and most of the colonial markets.

In steam pumps, a comparison of English and American patterns is equally unfavorable to the former. Of the four steam pumps shown among the illustrations of Messrs. Joseph Evans & Sons, two are copies of American patterns in their general features. One is a Woodward and all intents and purposes, and the other a Cameron. The superfluous metal shown is an ample refutation of their third statement. English pumps are notoriously heavy, a fact shown on every English steamer coming into New York.

The statement of Messrs. Joseph Evans

& Sons, to the effect that they have examined the leading American pumps and compared them with their own, is a most extraordinary one. We can account for it in two ways only. Either they have not done so, but hoped to make us believe that they had, or else their other statements were made with a full knowledge of their entire untruthfulness. Such a comparison would have been a complete demonstration of the superiority of the American pumps in the points mentioned in our article. There are many other points which we would be glad to have the manufacturers themselves present, and we accordingly turn over to them the above letter, to deal with it as they see fit. Our correspondents have invited the truth by attacking the reputation of American pumps in English prints, and they have no right to complain if unpleasant facts are called out in reply. The English reader is not such a fool as to be misled by buncombe abuse of an important American product by a firm interested in the manufacture and sale of competing goods.

Sliding Scales.

The article on sliding scales, in our issue of June 30, has called out from the Amalgamated Association the statement that "there is now in force in the different mills 'throughout the United States, the workmen in which belong to the Amalgamated Association, 46 different sliding scales, 'governing as many different branches of 'labor.' This is largely the result of the work of the last two or three years, as there were but few scales in force prior to 1879. It is certainly a source of congratulation that the causes of strikes are so much reduced as this number of sliding scales indicates, but it should still be borne in mind that in many cases these scales have only been accepted under protest, as the best thing that could be done under the circumstances, and that over certain of them a contest will be waged some day. We do not say that the contest will be over scale or no scale, but over the basis of the scale. In anticipation of this struggle, and to avoid it if possible, as well as to avoid other troubles that may arise, or to settle them amicably when they do arise, we still insist that the thing to be done, and the thing that reasonable and sensible men ought to do, is to come to some agreement by which these questions shall not be settled by strikes, but by arbitration. One side or the other may assume to be able to decide what is just and right, and, having the power, may enforce their views; but the side that does this is unjust and arbitrary, and, if the laborer does it, he is as unjust and tyrannical as the capitalist. The fact that a man is a laborer does not alter the quality of the act.

Condition of the Building Trades.

The large and continued demand for all kinds of hardware, giving the unusually active summer trade which has been noted from week to week in our trade report, results from the exceptional and healthful activity of building operations throughout the country. It is probable that every reader of *The Iron Age* is aware of the fact that the building trades are prosperous at the present time, but few who have not been brought personally in contact with this activity in different parts of the country, realize how general it is or to what extent building operations are going on in every State and Territory.

Carpentry and Building for July presents a bird's eye view of the building industries throughout the whole extent of the country, giving special prominence to the question of wages. In order to obtain the information necessary to write such an article, nearly three thousand circulars of inquiry were sent out to subscribers to that journal located at as many different post offices. The response was very general, coming from every State in the Union, and embracing all the principal cities and towns as well as many places of less importance, making a more comprehensive report possible than has ever before been presented. The three lines of trade considered are carpenters, masons and house painters. We give the substance of the article referred to below:

To give the result of the survey in the fewest possible words, we might say that the "boom" extends all along the line. The building business is brisk. Mechanics in general are fully employed. Wages are fair, and in many directions there is an upward tendency. All the building that it is reasonable to expect can be completed before the bad weather of the fall and winter sets in, has been undertaken in nearly every community. In short, there has never before been such a season of general prosperity in the building trades in the history of the country.

Wages vary according to localities, being for the most part lowest where living is the cheapest, and highest where living costs the most. The ratio, however, is not maintained in all cases, and if close estimates were to be made we think it would be discovered that those who live and labor in communities where rents, provisions and supplies generally are cheap, have the advantage of their fellows in the larger cities, even though the wages of the latter are considerably higher. The average of nine principal cities situated in the East and on the Atlantic seaboard, considered together, shows that carpenters are receiving about \$2.50, masons a trifle over \$3, and painters about \$2.50 per day. By this comparison it appears that Boston is paying the average prices of the cities named, while New York and Philadelphia are paying above the general average. A like calculation made for nine of the principal cities of the Western States gives a very similar result, the exact figures being carpenters, \$2.44; masons, \$3.11, and

CONDITION OF THE BLAST FURNACES OF THE UNITED STATES, JULY 1, 1881.

(Compiled for *The Iron Age*).

Location.	CHARCOAL.					ANTHRACITE.					BITUMINOUS OR COKE.				
	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Capacity per week.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Capacity per week.	Total number of stacks.	Number reported in blast.	Capacity per week.	Number reported out of blast.	Capacity per week.
New England	17	12	910	5	365	1	1	160	0	.....	.....	.....	.....	.....	.....
New York	16	11	749	5	255	43	25	5,870	17	3,300	.....	.....	.....	.....	.....
New Jersey .....	.....	.....	.....	.....	.....	18	11	3,310	7	1,425	.....	.....	.....	.....	.....
Spiegel .....	.....	.....	.....	.....	.....	3	2	100	1	50	.....	.....	.....	.....	.....
Pennsylvania.....	38	24	1,230	14	689	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lehigh Valley.....	.....	.....	.....	.....	.....	50	37	9,954	13	2,990	.....	.....	.....	.....	.....
Schuylkill Valley.....	.....	.....	.....	.....	.....	49	31	6,604	18	3,890	.....	.....	.....	.....	.....
Upper Susquehanna Valley.....	.....	.....	.....	.....	.....	25	9	1,945	16	3,565	.....	.....	.....	.....	.....
Lower Susquehanna Valley.....	.....	.....	.....	.....	.....	42	28	4,995	14	2,275	.....	.....	.....	.....	.....
Pittsburgh.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15	12	7,930	3	950
Allegheny Valley.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	4	774	0	.....
Shenango Valley.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32	14	4,335	18	4,390
Youghiogheny Valley.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	4	1,180	2	535
Junata and Conemaugh Valley.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27	19	5,415	8	1,650
Maryland.....	15	9	575	6	345	5	2	375	3	340	4	0	.....	4	460
Virginia.....	31	14	752	17	772	1	0	.....	1	140	8	7	1,325	1	250
North Carolina.....	7	0	.....	7	264	.....	.....	.....	.....	.....	6	3	1,400	3	510
West Virginia.....	6	1	100	5	410	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mahoning Valley.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17	11	3,750	6	2,020
Eastern, Central and Northern.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24	15	4,185	9	2,270
Hocking Valley.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13	10	1,617	3	465
Hanging Rock.....	31	24	2,254	7	570	.....	.....	.....	.....	.....	17	10	1,640	7	1,145
Miscellaneous.....	3	0	.....	3	268	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kentucky.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	3	950	1	150
Hanging Rock.....	10	5	550	5	390	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Western region and Miscellaneous.....	8	1	50	7	570	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee.....	19	5	440	14	905	.....	.....	.....	.....	.....	8	6	1,975	2	570
Georgia.....	8	3	335	5	148	.....	.....	.....	.....	.....	3	1	400	2	200
Alabama.....	12	9	1,175	3	250	.....	.....	.....	.....	.....	4	4	1,400	0	.....
Indiana.....	1	0	.....	1	140	.....	.....	.....	.....	.....	3	2	290	1	150
Illinois.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14	9	4,150	5	2,025
Michigan.....	27	18	3,820	9	1,545	.....	.....	.....	.....	.....	1	0	.....	1	280
Wisconsin.....	11	8	971	3	370	.....	.....	.....	.....	.....	3	3	1,200	0	.....
Minnesota.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri.....	12	3	685	9	1,358	.....	.....	.....	.....	.....	8	7	4,850	1	525
Texas.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oregon.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	276	147	14,596	125	9,614	236	146	33,313	90	17,975	221	144	48,796	77	18,548

painters, \$2.33. Of these cities, Chicago and St. Louis are paying considerably above the average, the figures for the first named being carpenters, \$3; masons, \$3.50, and painters \$2.50, and for the latter, carpenters, \$2.75; masons, \$3.75, and painters, \$2.50. Omaha reports carpenters, \$2.75; masons, \$3, and painters, \$3. Going still further West, the general average shows an increase. When we get to some of the mining towns the figures reported are apt to fill mechanics in the older parts of the country with envy. Four dollars per day for carpenters and masons is not an exceptional rate. The average of all the towns in Colorado from which we have replies indicates high prices generally. They are as follows: Carpenters, \$3.25; masons, \$4.25; painters, \$3.25 per day. The few towns in New Mexico where building operations are being carried on pay wages even higher than the figures last named, and the same may be said of Arizona. We do not anticipate that this announcement, however, will cause a stampede of mechanics to the region named, for many of the inhabitants of these districts, in the simplicity of their hearts, consider a wigwam or an adobe hut entirely sufficient for all purposes. Our figures from Utah are lower than those last quoted, and the reports show a little more of the enterprise of civilization. Salt Lake City, in spite of Mormonism, is building actively, and carpenters command \$3; masons, \$3.50, and painters, \$3 per day. The report from California is not as cheerful as from most of the States. A number of large blocks are going up in San Francisco, but building operations cannot be called brisk in the sense in which that term is employed in the East. Quotations of the labor market from that State may, therefore, be declared to be nominal, for in almost all cases less than the full number of mechanics are employed. Carpenters are receiving all the way from \$2.25 to \$4 per day; masons from \$3 to \$4.50, and painters in about the same proportions. The highest figures are paid in the mining towns. Far off Oregon reports a fair activity in her towns and cities, with wages for carpenters at \$3.50; masons, \$4, and painters, \$3 per day.

Returning eastward and to the South, all the reports we have from Texas show that mechanics are generally employed in that State. The lowest quotation for carpenters is \$2 per day and the highest \$3. Masons' wages range from \$2 to \$4 per day. The average of the State by the reports received is as follows: Carpenters, \$2.32; masons, \$2.82, and painters, \$2.50 per day. Galveston pays the highest prices in the State, the rates being: Carpenters, \$3; masons, \$4, and painters, \$3.50 per day. From Louisiana the general report is that mechanics are fairly employed, and that building operations are moderately active. At Shreveport carpenters are getting \$3.50; masons, \$4, and painters, \$3.50 per day. Along the Mississippi River prices are much lower—\$2 for carpenters, \$3 for masons and \$2 for painters being near the average. Only one town in Arkansas reports building operations dull, the prospect not encouraging and mechanics only partially employed. The wages reported seem to account for this condition of affairs. They are as follows: Carpenters, \$3; masons, \$5, and painters, \$2. The general average through the State is about \$2.50 for carpenters, \$2.75 to \$3 for masons and \$2.50 for painters. Our returns from Mississippi show about the same average as last quoted. From this State we have reports of both white and colored labor, the latter being about 25 per cent. lower than the former in places where both are given. In Alabama the general average also appears to be about the same. Mobile reports building operations very slow, with wages nominally \$2.25 for each of the trades quoted. There

is no special activity reported in Florida. In Georgia there is more doing. Mechanics are quite generally employed, and the prospects for the immediate future are promising. Wages average lower than in States last named, and are about the same as a rule in North and South Carolina. They may be quoted as follows: Carpenters, \$1.50 to \$1.75; masons, \$1.75 to \$2; and painters, \$1.50 to \$2. Savannah reports carpenters, \$1.75; masons, \$2.50; and painters, \$3, from which we infer the people of that town appreciate paint more than they do foundations and superstructure. Throughout Virginia the outlook is reported as promising. Wages are at neither extreme. In Richmond they are said to be, carpenters, \$2.25; masons, \$2.50; and painters \$2. At Hampton, where several important buildings are in progress, the rates are a little higher. Crossing the mountains we find about the same general conditions prevail in West Virginia. In Maryland mechanics are very generally employed—\$2 for carpenters, \$2.50 for masons, and \$2 for painters being about the general average. From Baltimore the report is, carpenters, \$2.25; masons, \$3.50 to \$4; and painters, \$2.25. Delaware is fairly active, with rates somewhat less than reported for Virginia.

Coming back to our original starting point, the Eastern Atlantic States present unusual activity in building matters in almost all sections. The smaller towns vie with the larger cities in the variety and extent of their enterprises. Maine, New Hampshire and Vermont are perhaps less active than Massachusetts, Connecticut, Rhode Island and New York, although they are by no means dull. For Maine the general average of rates indicates that carpenters are receiving \$1.75 to \$2; masons, \$2 to \$2.75; and painters, \$1.75 to \$2.25, according to location. Rates are a little higher in New Hampshire, and about the same in Vermont. The average for Massachusetts is about \$2.25 for carpenters, \$2.75 for masons and \$2.25 for painters. These are the exact figures reported for Providence, and are also about the general average for both Rhode Island and Connecticut. Reports from 96 different points in New York show that mechanics are very generally employed throughout the State at present, and are likely to remain so until bad weather sets in. In almost every town of any importance a church, a hotel, a factory, a school-house, or some other important building enterprise is reported. In the smaller places wages average about \$2 for carpenters, \$2.75 for masons and \$2 for painters. In the larger cities rates are from 25 to 50 cents per day higher. It would require more space than we can devote to this entire article to give a detailed account of building operations in this city. It is estimated that the work now in progress represents an expenditure of upward of \$25,000,000. The building activity of the present season is unprecedented. The business structures being erected are remarkable for height and amplitude of dimensions, and the dwellings are notable for the elaborateness of ornament employed and their costliness beyond the work of any other period. It seems to be settled that the down-town streets are to be lined with rows of buildings from eight to ten stories high. Ground-room grows dearer every year, but sky-room costs nothing. The suburbs of New York also present scenes of activity. Among them Orange, N. J., a city which by the last census shows the most rapid growth of any in the country, is especially busy in adding new dwellings for New York's business men. Wages in this locality are reported as follows: Carpenters, \$2.50; masons, \$3; and painters, \$2.50. New Jersey is generally active, wages, however, ranging somewhat below those just quoted.

Turning our bird's-eye view again Westward, we find Pennsylvania well up to the general average in building enterprises. Many of the smaller towns report fine dwellings, showing that some of the money which has been made in the past few years is now being expended. Taking the State as a whole, wages average about \$2 for carpenters, \$2.25 to \$2.50 for masons and \$2 for painters. Ohio, Indiana and Illinois are all very busy. Opera houses, town halls, school-houses, churches, court houses, business blocks and costly dwellings seem to be the order of the day throughout the regions named. There is hardly a town of any importance but sends in an account of some such enterprise. Wages through Ohio seem to average about \$2.25 for carpenters, \$2.75 to \$3 for masons, and \$2 to \$2.25 for painters. The general average for Indiana is 12½ to 25 cents per day less. The smaller places throughout Illinois show about the same results, with higher figures in the cities. The figures in Tennessee and Kentucky are lower, averaging not over \$2 for carpenters, \$2.50 for masons and \$2 for painters. Building operations are less active in these States than northward across the Ohio River.

Missouri and Iowa are scenes of activity in building matters at the present time. What we have said about Ohio, Indiana and Illinois applies as well to them. Wages in Missouri average \$2.25 for carpenters, \$3 for masons and \$2.25 for painters. In Iowa the average is slightly above these figures, with rates considerably in excess at those points where operations are unusually extensive. The lower peninsula of Michigan is quite active, with wages averaging about as quoted for Ohio. Wisconsin does not seem to manifest equal enterprise, although building matters for the State at large cannot be declared dull. Wages average about \$2 for carpenters, \$2.50 for masons and \$2 for painters. In Minnesota business is better and rates are higher, the average being something like \$2.25 for carpenters, \$3 for masons and \$2.25 for painters.

NEW PUBLICATIONS.

RYLAND'S IRON, STEEL AND TIN-PLATE TRADER'S DIRECTORY. By the editor of the *Iron Trade Circular*, Birmingham, 1881.

Besides twelve maps of the iron works, coal mines and iron-ore mines of Great Britain, this directory, the first of its kind published in England, if we are not mistaken, contains a list of the blast furnaces, rolling mills, steel and tin plate works of Great Britain. We notice that the rolling mills are enumerated besides in a series of tables under such headings as follows: Bar, angle, hoop, nail rod, plate, nail sheet and section makers, so that it is easy to obtain an idea of those that have devoted themselves to the manufacture of some specialty. The list of trademarks, of iron mines, collieries, &c., adds to the value of the book, which, however, we regret to say, has been given inconvenient proportions.

The new enlarged canal at St. Mary's River, which controls the entrance to the great iron and copper mines on Lake Superior, will be opened and the first vessels locked through not later than August 1. So says the *Marquette Mining Journal* of July 2. The passage can then be made by vessels drawing 13 feet of water.

A Montreal paper claims that great success has attended the efforts of the Ottawa government to encourage manufacturing industries in Canada. The editor says: "Never in the history of Canada was there so large a number of men earning good wages as to-day."

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World's Best Can Opener.

Patented February 3, 1880.

This Can Opener has forced its way into the market by virtue of its superiority, it being formed of One Piece of Steel, and capable of standing ten times the use of an ordinary riveted or screw-blade opener.
The trade is hereby warned against purchasing the World's Best Can Opener from any one except ourselves or our authorized agents, our patents being secured to us in the most perfect manner.

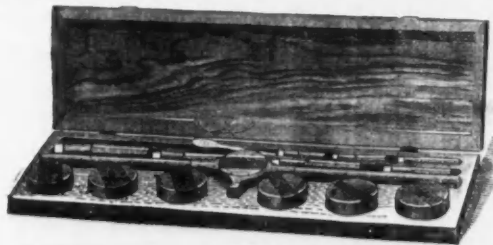
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The Best in the Market.
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MADE BY
**WELLS BROS. & CO.,
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Manufacturers of Taps, Dies, Taper Reamers, Bolt Cutters (hand or power), Samson Tire Shrinker, Tire Bender, Foot Vise and other Blacksmiths' and Carriage Makers' Improved Tools.
Send for prices and Illustrated Catalogue.



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Please notice that we have removed from No. 295 THIRD AVENUE to
No. 37 Warren Street, near Church St.,
Where we hope to be favored with a continuance of your generous patronage.

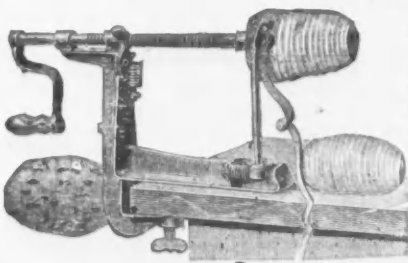
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Successors to DAY, FARRINGTON & CO., Manufacturers of

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GOODELL'S WHITE MOUNTAIN POTATO PARER.

Patent Applied For.



The White Mountain Potato Parer is the only machine ever made that will not only pare a potato much better than it can be done by hand, taking off a thinner paring from every shape or kind of potato, but will go into and clean out the eyes, and altogether at a saving of at least 20 per cent. It is free from the objections made to the old style of rattletap, geared parers; is solid and substantial, cannot get out of order, and so cheap as to be within the means of everybody.
Almost any of the Potato Parers in the market seem as if they might do the work better "next time," but the "White Mountain" DOES IT NOW. Every Machine warranted as represented.
Price to the Trade, \$8 per dozen.

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BILLET AND WIRE CO.,**

Sole and exclusive manufacturers of "Wheeler's Combination" Shoes, Shoe Bars and Toe Calks. Tire and Wire. Full particulars upon application by mail or otherwise to WARE & GAY, Treasurer, 66 State Street, Boston, Mass. All persons cautioned against infringements.

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Sole Manufacturers,
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Variable Blast Tuyere Iron**

This cut represents the interior of the Tuyere, showing the rotating air tubes through which four different sized currents of air may be passed, thereby making any sized fire from two to 18 inches in diameter; for instance, if a large fire is being used and the next job should be a nail rod, we do not move or burn the large bed of coal,



but turn the small tube up and so concentrate the heat to the point desired.

The constant flow of water keeps the Tuyere cool and prevents cinders or clinkers from forming in the fire. To prevent the water from freezing in the pipes, the barrel is supplied with a faucet that empties the pipes but not the barrel. All the dirt from the fire sifts through the perforated fire cap into the dirt box, from which it is blown by the blast when the ball valve is raised for that purpose. I also furnish Tuyere Irons without water attachment. See first issue of the month.

After having used your "Variable Blast Tuyere Iron" three months, I pronounce it perfect in every respect, and it actually saves from 25 to 50 per cent. of the coal. CHAS. VAN HORN, Earlville, Ill.

Send for price list and discount.
A. W. MORGAN, Patentee and Manufacturer,
Office, 52 Vance Block, Indianapolis.

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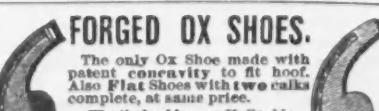
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CRANK PIN MACHINE,**
For turning off Crank Pins in position and while the wheels are under the engine. No railroad company should be without it. Manufactured and for sale in the

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Descriptive circular on application.



The only Ox Shoe made with patent concavity to fit hoof.
Also Flat Shoes with two calks complete, at same price.
Worth double any Malleable Iron Shoe.

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Repairs for Stoves made at Troy, Albany, Rochester, Cleveland, Buffalo, Boston, St. Louis, Quincy, Chicago, Milwaukee and elsewhere, at
W. C. METZNER,
127 W. Randolph St., Chicago, Ill.



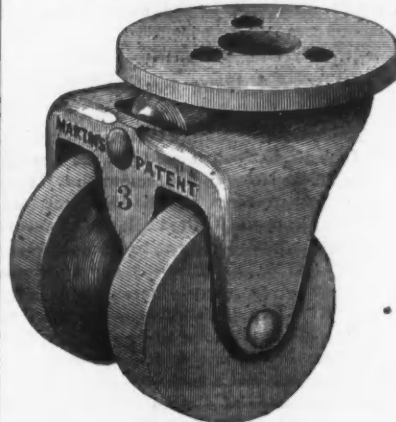
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Office of

PHOENIX CASTER CO.,

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George A. Ruhleman & Co., St. Louis, Mo., have sold our Casters as follows:

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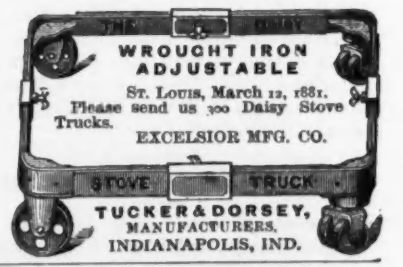
Our Caster is no experiment. The people will have it, if it does cost more than the shams on the market. Eight-inch Mill Files are no better stock. Introduce yourself to these goods by a very small stock order of our selection. Terms, 60 days. Ship them back if they fail in your esteem. Send for catalogue.

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Manufacturers, INDIANAPOLIS, IND.



Our Drawer is so uniform, durable, strong and effective, that it has nearly driven all competition from the field.



St. Louis, March 12, 1881.
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MANUFACTURERS,
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Superior to Phosphor Bronze or any other alloy of Copper and Tin for Machinery Journals.

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Very truly,
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Is the favorite everywhere.

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Iron, Steel, Copper, Brass, Zinc and other metals punched to any size and thickness, for all uses.

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Special discounts to the trade. Correspondence solicited.

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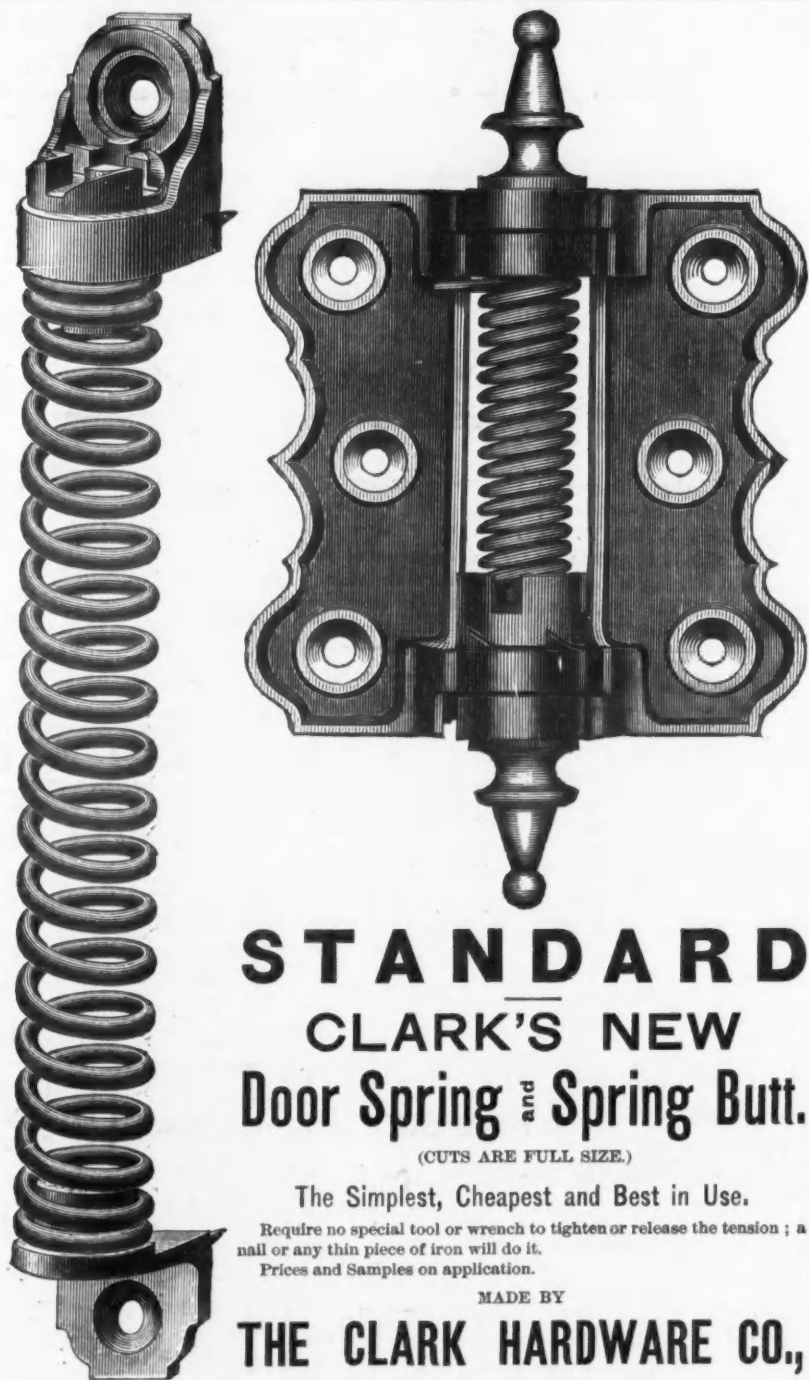
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Adapted for the use of Boys, Youth, Gentlemen, Farmers, Planters, Carpenters, Railroads and Mines; fitted up complete with a superior quality of Tools, and suited to the wants of the Hardware, Toy, Nail and Variety trades. Export trade solicited, and a full stock of large-sized Chests always on hand. Quality considered, we think our goods will be admitted by buyers the United States or Europe. Illustrated descriptive catalogue furnished free on application with prices.

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CLARK'S NEW
Door Spring and Spring Butt.**

(CUTS ARE FULL SIZE.)

The Simplest, Cheapest and Best in Use.

Require no special tool or wrench to tighten or release the tension; a nail or any thin piece of iron will do it.
Prices and Samples on application.

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**THE CLARK HARDWARE CO.,
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**Gentlemen.—This cut illustrates our
CAST IRON
Furnace Lamps**

which are superceding entirely the Tin Lamps wherever introduced, in consequence of their durability. They are now extensively used in the Iron Districts of Ohio and some in Pennsylvania. We call your attention to and solicit your order for them, confidently asserting that they are an A No. 1 article in every respect.

Sample sent if desired.
PRICE, \$12 PER DOZEN.

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MANUFACTURERS OF
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The Iron-Masters' LABORATORY.

Exclusively for the
Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags and Coal for Practical Metallurgical Purposes.
No. 339 Walnut St., Philadelphia.
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This laboratory was established in 1866, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

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For determining the per cent. of Pure Iron in an ordinary Ore..... \$4.00
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For each additional constituent of usual occurrence..... 1.50
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For determining the constituents of a Clay, Slag, Coke, or of an Ash in Coal the charges will correspond with those for the constituents of an ore.
For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.
Printed instructions for obtaining proper average samples for analysis furnished upon application.

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Superior to any other Light for Mining

Purposes. Manufactured by
**JAMES BOYD'S SON,
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Grindstones, Emery, &c.

**Walter R. Wood,
GRINDSTONES.**

Berea, O., Nova Scotia, & other brands
283 and 285 Front Street, New York.

GEO. CHASE,

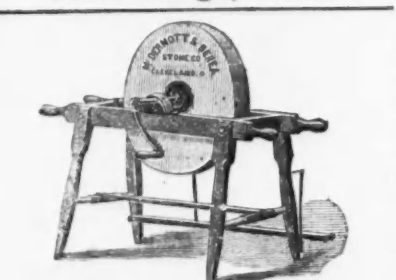
The largest manufacturers in the world of
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Of all description.
107th Street and Harlem River,
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Superior Ohio Grindstones, manufactured by P. L. Cole, Centerville, Ohio, will be supplied to the Southern trade at lowest possible rates by

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Of All Kinds.
127 Superior Street,
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**LOMBARD & CO.,
Importers and Dealers in all kinds of**

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Stones for Machinists, Carpenters, Farmers and Glass Cutters constantly on hand and cut to order.

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Quarrymen and Stone Merchants.**

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of genuine Nova Scotia and other grits from our own quarries. Mounted stones and fittings, scythes and oil stones, polishing grits, &c.
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Large stock on hand, especially suited to Saw and Shovel Manufacturers, at bottom prices.
Importers and Manufacturers of
PURE TURKISH EMERY.

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123 Chambers St., New York.**
Send for quotations and samples.

WASHINGTON NOTES.

Factory Inspectors and Workman's Insurance in Germany.

(From Our Own Correspondent.)

WASHINGTON, D. C., July 12, 1881.

The Department of State has received a copy of the "Reports of the Inspectors of Factories for the German Empire," which gives much interesting and important information on the system established in that country in the interests of the general administration of factories and of those employed in them. This system of surveillance was instituted in 1853 in the Rhine Provinces of Prussia, but it was not until 1878 that the employment of these officers became general throughout the empire. About a year ago a law was introduced into the Bundesrath providing for the protection of workmen in factories against injury and loss of life, but was withdrawn on account of the opposition of the manufacturers, and a commission of experts was appointed to frame a more acceptable measure. This commission has submitted a code of rules and regulations for the protection of workmen in factories against injury and loss of life. Among the provisions are—sufficient light to suit the work; 175 cubic feet of air at least to each workman; protection against the destructive influence of poisonous gases and dust; proper fire escapes; safety lamps where explosives are made; sufficient width of passage guards against machinery, &c.

In this connection was submitted the draft of a proposed law in relation to the insurance of employees in mines, factories and other industries against accident and death. As insurance and endowment associations for the benefit of the working classes are becoming quite common in the United States, the scheme proposed in Germany may not be without interest at this time. This law proposes that all employees in mines, salines, quarries, docks, buildings and iron mills whose income does not exceed 2000 marks (about \$480), shall in future be covered by an insurance bureau. This bureau is to be established, controlled and managed by the imperial government in accordance with laws enacted by the Bundesrath, and in the interest and on behalf of the insured. Insurance is to be against accident or death received in performance of work. All industries are included, except navigation and railways. The object of this insurance is to indemnify the workman in case of his becoming disabled and prevented from following his occupation for four weeks or more, or his family or heirs in case of death, the indemnity to be paid as follows:

1. Cost of care after commencement of fifth week. 2. A pension after that time, in case of total disability, amounting to 66 2/3 per cent. of yearly income; and in case of partial disability, not less than 25 per cent. and not more than 50 per cent. of the yearly income. In case of death: 1. Ten per cent. of yearly income for funeral and kindred expenses. 2. If death occurs four weeks after the accident or later, total cost of medical attendance and 66 2/3 per cent. of earnings. The heirs of the deceased are to receive a yearly pension from the date of death.

The industries named are required to insure their employees collectively, for which a certain premium is to be paid, regulated quarterly, and in accordance with the risk and amount of wages paid. For those earning yearly 750 marks (about \$180), two-thirds of the premium to be paid by the employees and one-third by the poor association of the district. For those earning yearly more than 750 marks, half of the premium is to be paid by the employer and half by the insured. The employer is compelled to report every accident to the Police Department within three days, and the proper agency of the Imperial Insurance Bureau is to make an investigation. After the establishment of the grade and character of the injury, the insured will receive a proper certificate. There are also further provisions for the execution of this law. The report submitted in this connection by the representative of the United States, says that great activity prevails among statesmen and legislators in the interests of the great industries of the empire, not only in their encouragement, but in guarding the interests and ameliorating the condition of the workmen.

Resources of Liberia.

The new United States Minister to Liberia, Rev. Henry Highland Garnet, expresses himself very favorably in regard to the prospects of that country. He says the outlook of Liberia is encouraging. There is already a considerable trade with England, Germany, France and Denmark. British and German capitalists are about to construct a railroad from Monrovia through the country to the interior wilds. The Liberians are, however, not in favor of European capital. They have become a nation under the fostering care of the United States, and they desire to repay this country by opening to it the vast and varied possibilities of their commerce. It seems strange that the United States should, after founding a nation, let all the benefits accruing from its existence be received by other countries. The Liberians are anxious for closer commercial relations with this country and are prepared to send here products of great value to us. If the time ever comes when the talked of line of steamers between New York and the Liberian ports are in operation, the country will begin to realize how great are the advantages to be derived from a close commercial relation with the African Republic. Coffee, cotton, dye woods, tobacco and almost every variety of tropical production Liberia raises and exports. As the market spreads the production will, of course, increase.

"The Liberians are not able, alone, to develop the resources of their country. Other nations see the coming importance of Africa, and England on the south and France on the north are already in the field and are beginning to reap the harvest. Will the United States, with such an opportunity ready at their hands, stand by and see the trade of Africa absorbed by other nations, and European influence dominant in the

dark continent? Liberia is the only real Republic in Africa, and, if properly cherished, it will be the fountain head from which not only civilization but republicanism will disseminate itself over Africa.

"It will not be many years before the importance of Africa will be realized. In fact, this country seems to be the only one that has not already seen her growing greatness. It is certainly the coming continent, and capital spent in opening up her resources will be well invested. There are in Liberia forests of valuable wood, mines of gold, silver and iron, and a soil capable of producing the most valuable crops. The cotton product alone, if developed, would be immense. There is a strong feeling of love for this country, and the United States would have little difficulty in monopolizing the trade of the country. When I reach my post I shall do all in my power to bring the United States and Liberia into more intimate relations."

Imports of Metals &c., at New York, for Three Months.

Below we give a comparative statement of the value of the imports of a few leading articles for the second quarter in each of the last three years.

	1879.	1880.	1881.
Copper and Ore.....	\$10,922	\$20,511	\$21,015
Iron, bars.....	356,285	5,626,864	501,862
Iron, pig.....	63,817	3,354,033	1,553,770
Iron, sheet.....	31,074	153,359	36,685
Lead, pig.....	5,706	701,731	74,334
Spelter.....	23,874	105,028	27,824
Steel.....	174,489	1,307,164	1,865,351
Tin, slabs.....	925,588	1,754,235	664,483
Tin, plates.....	1,770,316	2,784,010	1,016,327
Zinc.....	10,939	58,270	14,164

The various articles imported within the last quarter are named more specifically, as follows:

	Quantity.	Value.
Anvils.....	2,122	\$21,729
Bismuth.....	11	5,110
Brass goods.....	258	26,952
Bronzes.....	223	51,488
Chains and anchors.....	396	20,850
Copper.....	8,018	8,018
Cutlery.....	1,520	458,872
Clocks.....	254	37,719
Pins.....	51	9,100
Gas fixtures.....	8	3,526
Guns.....	1,631	222,826
Hardware.....	218	18,301
Iron hoop, tons.....	103	2,096
Iron pig, tons.....	74,004	1,553,770
Iron, sheet, tons.....	494	26,685
Iron, railroad, bars.....	139,242	1,116,131
Iron, cotton ties.....	1,200	1,004
Iron tubes.....	320	1,591
Iron ore, tons.....	59,076	178,319
Iron, other, tons.....	17,106	51,802
Lead, pigs.....	15,226	74,334
Metal goods.....	2,987	244,247
Machinery.....	1,357	15,734
Nails.....	304	15,352
Needles.....	185	91,374
Nickel.....	85	23,073
Old metal.....	.....	1,379
Platina.....	21	54,034
Plated ware.....	26	4,191
Percussion caps.....	228	18,442
Saddlery.....	216	9,932
Steel.....	290,106	1,865,351
Spelter, lbs.....	728,355	27,824
Silverware.....	67	9,783
Tessels.....	5	171
Tin, bbls.....	89	5,072
Tin plates, boxes.....	417,894	1,016,327
Tin slabs, lbs.....	3,100,409	664,483
Wire.....	4,811	63,016
Zinc, lbs.....	325,418	14,164

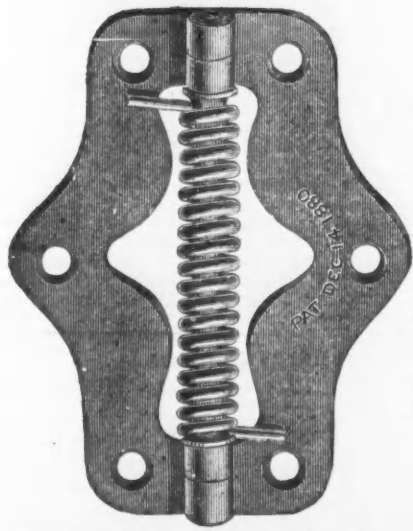
New Phase of Bi-Metallism.—It is now asserted that the drain of gold is not toward Europe or India, but in the mouths of American people, under the persistent practice of dentistry. So literally is this true that few of our people can smile without giving surface indications of gold. The facetious mathematician of the *Times* surmises that, at the present rate of disappearance, our gold supply will have been deposited in American cemeteries in not less than 300 years. What then? Will unfeeling speculators be permitted to organize, for example, a "Greenwood Bonanza Company," and to publish a prospectus asserting that surface indications of gold-bearing citizens are particularly rich in its territory; that it has erected a mill capable of crushing 20 full-grown or 30 juvenile jaws daily, and that, so far as its mining operations have been conducted, the yield has averaged 70 ounces of gold to every ton of deceased citizen? Will decent people be willing to see prospectors digging in every graveyard in the country, and will mourning friends calmly submit to see a rich corpse of a recently dead citizen "jumped" by some ardent miner? It is scarcely probable that this violation of cemeteries and this crushing and smelting of gold-bearing citizens will be permitted. If speculators attempt anything of the kind, there will be endless disputes between mining companies and the heirs of the occupants of cemeteries. The authorities will have to give their whole attention to preserving the peace, and the advocates of the recovery of gold and its restoration to its former place in the currency of the world will be called "ghouls" by the silver men, which, on the whole, is rather a worse word than "Shylocks." The only way in which the disappearance of gold can be prevented is by finding a substitute for it as a material for filling teeth. If this is done in time, gold may continue in circulation. If it is not done, the triumph of the silver-mine owners is inevitable and only a century distant.

De Lesseps' Directors Admitted.—At a meeting of the directors of the Panama Railroad Company on the 6th the De Lesseps Canal Company was admitted to representation in the board in compliance with the agreement recently made for the purchase of the road. The new directors are Richard W. Thompson, chairman of the American Committee; John W. Ellis, of Winslow, Lanier & Co.; E. P. Fabbri, of Drexel, Morgan & Co.; Jesse Seligman, of J. & W. Seligman & Co., members of the same committee, and T. J. Sabla, vice-president of the Mexican Telegraph Company. There was already one vacancy in the board, caused by the death of John R. Marshall, and four other places were made by the resignation of Samuel C. Thompson, Charles D. Leverich, George A. Hoyt and Christopher Meyer. The Canal Company will be entitled to one more seat next year, on the payment of another installment of the purchase money, and the board will then remain unchanged until the last payment shall be made.

SPRING HINGES.—SCOVILL MANUFACTURING CO.

WROUGHT IRON WITH BRASS SPRINGS.

Packed with Screws.



SINGLE JOINT.

	Per doz. Pairs.
2 1/2 inch, No. 301.....	\$3.60
3 " No. 303.....	4.40
4 " No. 305.....	6.75

DOUBLE JOINT.

	Per doz. Pairs.
2 1/2 inch, No. 311.....	\$7.20
3 " No. 313.....	8.80
4 " No. 315.....	13.50

WROUGHT BRASS.

SINGLE JOINT.

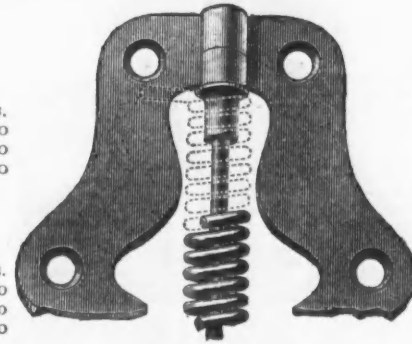
	Per doz. Pairs.
2 3/8 inch, No. 1.....	\$3.00
3 " No. 3.....	4.50
5 " No. 5.....	7.50

DOUBLE JOINT.

	Per doz. Pairs.
2 3/8 inch, No. 7.....	\$6.00
3 " No. 9.....	8.30
5 " No. 11.....	16.50

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WATERBURY, CONN.

Depots: { 419 & 421 Broome Street, New York.
177 Devonshire Street, Boston.
183 Lake Street, Chicago.



The above Spring is removed near the joint to SHOW the SLEEVE. This is the VITAL POINT in a Spring Hinge, and they are only to be found on Hinges of our manufacture. In all others the Spring will soon break from wear against the pin.

EXCELSIOR LAWN MOWER



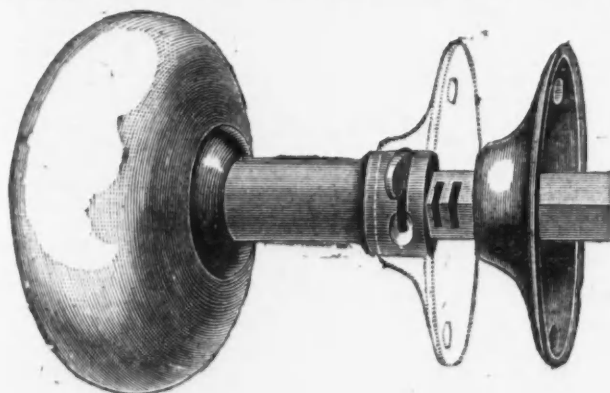
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Perfect Work, Light Draft and Simplicity.

We have received many first premiums in competitive trials with other Mowers, both in this country and a road. We have special patterns of Mowers for export, meeting the requirements of every market. Our new Horse Mower is conceded to be the *Lightest and Best* Horse Lawn Mower ever made. N. B.—Horse and Hand Lawn Mowers are alike guaranteed in all respects. Send for Illustrated Catalogue. Address

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IMPROVED FASTENING FOR



DOOR KNOB SPINDLES.

Patented May 21, 1872.

The above cut represents an important improvement for securing the Door Knob neatly and securely on the spindle without the use of screws. Architects, mechanics and dealers pronounce this device superior to anything of its kind in the market. In fact, no first-class Door Knob is complete without it. No extra cost to dealer or consumer.

Manufactured only by

THE CLARK MFG. CO.
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BOSTON, MASS.,

Sole Manufacturers in U. S. A. of our Celebrated

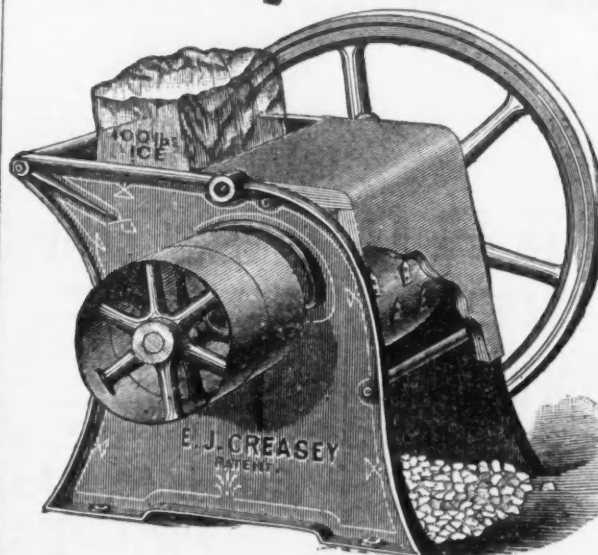
METALINE
AND

Star Roller Bush
Tackle Blocks.

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New York Warehouse, 33 South St.



Creasey's Ice Breaker.



In Use by
MEAT & FISH
Packers,
ICE CREAM
Makers,
HOTELS
AND
CONFECTIONERS.
FIVE SIZES.

Saves Time, Money
and Labor.

Send for Circular to

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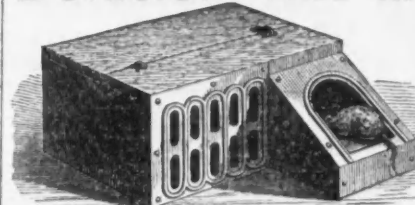
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SPECIALTIES: Fluting Machines, Hand Fluters, Plaiting Machines, Christmas Tree Holders, Bickford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, Ice Cream Freezers and Cake Mixing Machines.

Delusion Rat and Mouse Trap,



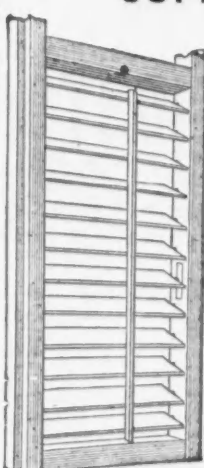
Manufactured by
CLAUDIUS JONES & CO.,
ERIE, Penna.

This is the only Self-setting Trap on the market, and the most successful. All orders direct to
CLAUDIUS JONES & CO.,
ERIE, Penna.

BENTLEY'S Perfect Blind Slat Holder.

Patented.

SUPERIOR TO ALL OTHERS.



For tightening the Slats of Window Blinds and holding them at any required angle.

The sunlight is let in or shut out at will. The blinds are made a much better protection from cold, because when the slats are shut they are so kept by the Holder and cannot be moved by the action of the wind. Noisy rattling of the slats is prevented.

The holder is securely held by its spring and the sharp points at each end. As it is made of brass it will not rust. It cannot get out of order. Its superiority over other holders is evident.

It requires no screws or nails to fasten it to the blind. Any one can apply it. It cannot get loose or deface the blind as others do.

Retail Prices.

No. 1, For Outside Blinds, 5 cents each; 50 cents per dozen.
No. 2, For Inside Blinds, two for 5 cents; 25 cents per dozen.
At which prices samples will be mailed postpaid.

Trade Prices.

No. 1, \$6.00 per gross; discount 50 per cent.
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FOR SALE BY THE TRADE.

In case your jobbing house cannot supply you, orders will be promptly filled by

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41 FOURTH ST., BROOKLYN, E. D., N. Y.

Patented Articles of Malleable Iron.

Hammer's Malleable Iron Oilers.
Three Sizes. Nos. 1, 2 & 3.



No. 1.

Hammer's Adjustable Clamps.
Hammer's Mail. Iron Hand Lamps.
Hammer's M. I. Hanging Lamps.
Pattern Heavy Screw Clamps; strongest in the market.
For sale by all the principal Hardware Dealers.
Send for Price List.

Malleable Iron Castings
of superior quality, and Hardware Specialties in Malleable Iron made to order.

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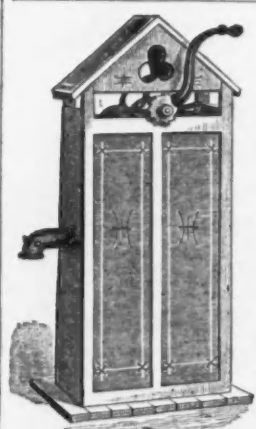
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of Transoms,
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Send for catalogue
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WINDOW WEIGHTS,

Sole Manufacturer of
Park's Patent Folding Lunch Box.
CLOTHES WRINGERS.



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INDUSTRIAL ITEMS.

MAINE.

The top house, elevator and stock house of the Katahdin Iron Works were burned last month, but the company have rebuilt and now have everything in readiness for business. Before the fire the company were making about 500 tons of iron per month. The present month and hereafter they expect to make about 600 tons monthly. This iron is shipped to all parts of the country, but is used chiefly in the manufacture of car-wheels. Heretofore they have employed 20 four-horse teams in hauling their iron to Bangor, the nearest railroad station, but on the 27 ult. a company was organized, under the general railroad law of Maine, to construct a narrow-gauge road from Bangor to the works, a distance of 20 miles. This road is to be called the Bangor and Katahdin Iron Works Railway, and O. M. Davis, Jr., of Bangor, has been elected president and Henry McLaughlin treasurer.—*Boston Commercial Bulletin*.

J. G. Torrey & Son, of Rockland, manufacturers of brass ship fastenings and trimmings, have increased the capacity of their works fully one-half during the past year, and are now so driven with orders that they intend to make another enlargement soon. This business was established in 1854, and has become one of the largest concerns of the kind in New England.

MASSACHUSETTS.

The Union Needle Works, at Middleboro', have shut down for two weeks.

J. A. Colvin & Son have sold their iron foundry at Athol to Worcester parties.

The Florence Sewing Machine Works, at Northampton, shut down on Saturday for a week or more to make repairs upon the engine.

The Chapman Valve Manufacturing Company, at Indian Orchard, employ 106 hands, while six months ago they only had 50. They have begun the foundations for a 50 by 60-foot brass foundry southeast of the main shop, and for several small buildings on the premises.

The Mason Machine Works, of Taunton, have manufactured and sent to the purchasers of the Campbell Press Company 525 presses to the 1st of July, about one per day since they began turning them out.

That the Chicopee Falls manufacturers are busy is evidenced by the following items: Recently the Chicopee Manufacturing Company sent off four carloads of cotton goods. The Belcher & Taylor Agricultural Tool Company two carloads of tedders and rakes. The Lamb Company one car of knitting machines. B. & J. W. Belcher, one car of mowers and tedders.

The Cape Ann Forge Works, Gloucester, have just added to their equipments a 6000-pound hammer, built by Morgan, Williams & Co., of Alliance, Ohio, and having all the latest improvements (new furnace, boiler and tools to correspond) are now prepared to take orders for a heavier class of forgings.

RHODE ISLAND.

Fred. I. Marcy & Co., manufacturing jewelers, of Providence, are doubling the capacity of their shop, which will increase the number of their employees from 45 to about 100.

The McWilliams Manufacturing Company of Providence, manufacturers of tools and machines for jewelers, silversmiths and watch-case manufacturers, have recently added about 33 per cent. to their general facilities. They have just put up an additional building, 40x78, for an office, blacksmith shop and pattern shop.

NEW YORK.

The machine works of Grant & Bogert, now in process of erection at Flushing, will be in running order by the 1st of August. The works will be of brick, the dimensions being 200 x 45 feet, and one story in height. Upward of \$10,000 worth of machinery has been purchased from the Pratt & Whitney Company for the works. The firm have also contracted for a 40-horse-power Buckeye engine and a 60-horse-power patent water front boiler.

Beckley Furnace (charcoal), in Columbia County, is now called Chatham Furnace, and is operated by the Chatham Furnace Company. She is making 70 tons per week car-wheel iron.

D. E. Paris & Co., of Troy, recently burnt out, have leased the Wager Foundry property, and are moving in. They expect to begin work at once.

PENNSYLVANIA.

The Elkins Manufacturing Company, of Philadelphia, in February last took possession of a disused planing mill, of moderate dimensions, on the west side of Tenth street, below Diamond, and, after enlarging it to three times its former dimensions, have entered into the manufacture of car builders' and cabinet makers' hardware, &c., on a large scale, under the management of Francis Clamer, the inventor of what is known as the "Ajax" metal, which will enter largely into the articles and goods manufactured at these works. This metal, which is said to possess extraordinary hardness and strength (having, it is claimed, 20,300 pounds tensile strength to the square inch), is a chemical amalgamation, of which copper is the foundation. For journal and machinery bearings it is said to be far superior to phosphor-bronze. It is now pretty extensively used in the manufacture of what are commercially known as "Boss" watch cases. Mr. Clamer invented this metal about 16 years ago, and manufactured it to a limited extent until recently, when Mr. Elkins, becoming aware of its usefulness, especially in the manufacture of stop cocks, valves, &c., in use in oil refineries and chemical works, in preserving them from injury by acids, a difficulty said to have never before been surmounted, made a business arrangement with the inventor, and, investing considerable capital in buildings and machinery, has gone into the manufacture of such articles into which the Ajax metal can be profitably introduced. The buildings now complete and in use are one, two and three stories high, and a portion of them is supplied with the necessary machinery. Additional machinery is being put in place as fast as it can be received from the builders. Fifty hands are now working, but when the concern is fully sup-

plied with machinery it is stated that 300 hands will be employed. Upward of 14,000 pounds of Ajax metal are made daily, and its use in the works with the demand for it elsewhere is fully up to the supply. The making of the Elkins gas machine is also carried on at this establishment, and a considerable business is done in its manufacture. Frames for street lamps are also made here in large quantities. The manufacture of timmer's solder is still another line of trade carried on.

Yerkes & Plumb, edge tool manufacturers, Church street and Trenton Railroad, will shortly erect new works at Whitehall, near Bridesburg, Philadelphia. Four acres of ground will be taken up and the following buildings erected: Forge shop, 50 x 200 feet; grinding and polishing house, 30 x 175 feet; two stories; warehouse, 30 x 175, two stories; tempering shop, 30 x 60 feet; engine room, 38 x 50, two stories. The buildings will be pushed to completion and will be occupied about the middle of November.

A pressed Philadelphia brick, from the new City Hall in that city, was subjected to a compression test in the powerful hydraulic press at the Watertown Arsenal last week and stood the test at 500,000 pounds, remaining between the plates full five minutes. From appearances the pressure could have been increased another 100,000 pounds without affecting it.

The William Cramp & Sons' Ship and Engine Building Company are now building four large iron steamships for the Iron Steamship Company of New Jersey. Two have been delivered and the other two are nearly completed, and will be ready for delivery on July 1st. Three of these steamers are of the same size, will each carry 1500 passengers, and are the most complete steamers ever built in Philadelphia. The Perseus, on her trial trip on June 4th, attained a speed of 20 miles an hour. The Cramps are also building two large iron steamships of 2000 tons each, for the Miners' Transportation Company of Baltimore. These two steamships are each 250 feet in length, 38½ feet beam, with 27 feet depth of hold. They will be driven by compound engines of 1000 horse-power. Cramps are also building a large iron steamship for Alexandre, of New York, to be called the City of Madrid. She will be the largest ship of this line, having registered tonnage of 2600 tons; 319 feet on load line and 342 feet in length over all, with three iron decks. The Messrs. Cramp have also laid the keel for an immense steamship to be built for the Pacific Coast Steamship Company, which will be named the Queen of the Pacific and will be 345 feet in length, 38½ feet beam, 26½ feet hold, with registered tonnage of 2600 tons; the engines will be 3000 horse-power. The steamship will have two iron decks. The steering apparatus will be worked by steam power. She will have three masts, and is expected to attain a speed of 16 miles an hour. There will be accommodations for 100 first-class passengers; the cabins will be finished in the finest style and upholstered in the most luxurious manner, and everything will be completed and ready for delivery in about six months. The Messrs. Cramp have a frontage on the river at their shipyard and machine shops, at Beach and Norris streets, of 800 feet, and at their basin dock and railway, at Beach and Palmer streets, of 230 feet, making a frontage on the Delaware of 1030 feet. Their dry dock is capable of taking in the largest ship, being over 460 feet long, 110 feet wide and 24 feet deep. They have now 2000 men employed, and the weekly pay-roll amounts to \$17,000. They use about 50,000 tons of iron a year.

The works of the National Gas Company, Norristown, have been rebuilt since the late fire in a manner much superior to the former buildings. New machinery has been put in throughout, and the entire works have a busy look. The contracts made during the past few months will keep the works going for some time, and the prospects are that before the winter sets in fuel gas will be in active use in several new localities. Black lead crucibles are among the articles of American manufacture which appear to meet with growing favor in Europe. R. B. Seidel, of Philadelphia, has recently made a shipment to Moscow, Russia, where they have a decided preference over English crucibles. Mr. Seidel has also had inquiries which will probably lead to business with parties in Scotland, Belgium, France and other countries in Europe.

At the Scott Foundry, Reading, business has been very brisk since early spring, and the machine shop has been in operation day and night. The second of three large cotton presses ordered is nearly finished, and a number of the castings have been made for the third one.

Springhill Furnace will be blown out this week in order that some necessary repairs may be made. This is one of the oldest furnaces in the State, and is owned and operated by the Fairchance Furnace Company.

Messrs. Snell & Mehar, machinists, Court street, between Second and Third streets, Reading, are at present engaged upon three vertical and two horizontal engines. They are kept constantly busy, and will soon make extensions to their building, to allow more scope for operations.

The last one of the five large passenger locomotives built at the shops of the Reading Railroad Company is very nearly finished, and four six-wheeler engines have been commenced. The first one of these has been put on the stocks and rapid progress is made on it. How soon the six-wheelers will be finished will depend upon the amount of repair work required on locomotives brought into the shops from the road. The work in the shops has been very plentiful for some time, and in some of the departments overtime has been made.

The Bloom Furnace, in the Upper Susquehanna Valley, is out, but will probably blow in again in a few days.

The tube departments of the Reading Iron Works are busily engaged on a contract for 60 miles of pipe and casings for the Standard Oil Company. The pipes are 2-inch and the casings 6-inch. A number of extra hands have been employed.

Stack No. 1, of the Dunbar Furnace Company, is again in blast and making between 70 and 80 tons of metal per day. Stack No. 2 will be blown in as soon as the new hopper arrives and is put in place.

The stove foundry of Messrs. Shantz & Keely, at Spring City, Chester County, was burned down on the 5th inst. The foundry was an extensive one, and employed 120 men. The loss is \$120,000, upon which is an insurance of a trifle over \$100,000.

It is said that workmen began overhauling the Wheatland Mill this week, preparatory to putting it into active operation at once.

The Logan Iron and Steel Company intend raising the height of Emma Furnace and putting in a new blowing engine some time this year.

PITTSBURGH AND VICINITY.

The glass works of Challinor, Hogan & Co., Duncan & Sons, Crystal Glass Company and Adams & Co., are running full time.

The works of the Spang Steel and Iron Company, at Sharpsburg, are progressing rapidly. One furnace is now used, and steel is put out to the amount of nine tons every day.

The Elina Iron Works is having a battery of four new boilers put in.

Atwood & McCaffrey, brass founders and iron pipe fitters, are pressed with business—too busy, indeed, to say anything to the papers.

VIRGINIA.

The new furnace of the New River Mineral Company, near New River, has just blown in. This is a charcoal furnace, with a 10½-foot bosh, and is making 50 tons a week.

Brown Hill, Walton and White Rock furnaces are all out of blast and putting in new hearths.

Powhatan Furnace will probably start before long.

WEST VIRGINIA.

The Moundsville Rolling Mill has been purchased by the Klonan Brothers, of Pittsburgh, and will be put into operation at once. The mill will be run on structural shapes.

The Wheeling Iron and Nail Company and the Belmont Nail Company are relining their furnaces. Both expect to be ready to blow in about November 1.

The Whitaker Iron Works are running half time on account of labor troubles.

OHIO.

Messrs. Warner & Swasey, who have been for some time located in Chicago, have found it necessary, owing to the rapid increase in the demand for machine tools and special machinery made by them, to enlarge their facilities greatly, which they have done by erecting a large, commodious building at Cleveland, on East Prospect street, between Wilson avenue and C. and P. R. R., and will occupy the same on or about July 1st, at which date the Chicago establishment will cease operations.

Wm. Resor & Co.'s stove foundry, in Cincinnati, was seriously damaged by fire on the 7th inst., flames having communicated from buildings near by, in which the fire originated. At present their losses are estimated at \$200,000, though many valuable patterns were saved.

A company, embracing some of the best business men and capitalists of Cincinnati, has been organized under the name of the American Iridium Company, with a subscribed capital of \$240,000, for buying, manufacturing and selling iridium.

The Butman Furnace Company, on Michigan street, Cleveland, are driving a most successful business. Though only in business since January, orders have continuously poured in, and they contemplate shortly erecting commodious buildings, when they will employ a much larger force.

The Speed Recorder Co., Kent, lately shipped 21 machines, one of which went to Derby, England. The machines are being successfully introduced in Europe. The company have received an order for casting 300 coal car wheels for coal companies at Akron.

W. J. Clark & Co., Salem, are putting into their works the second large power cutting machine, for cutting blanks from heavy plate and sheet iron to be stamped into elevator buckets. Their "Salem" bucket is being put to use in coal mines, iron mines, iron furnaces, &c., as well as in grain mills and grain elevators, and is found to be well adapted to such work.

The Cleveland Furnace Co., at Steubenville, are putting up a new iron hot blast stove. They have three in operation at present.

Dispatches from Youngstown are as follows: Herbert C. Ayer, of Chicago, president of the corporation of Brown, Bonnel & Co., is here making preliminary arrangements for building the largest plate and sheet mill in the world. It is the intention to have the new mill in operation by January 1, 1882.

Richland Furnace will blow in July 12.

The new Wrought Iron Fence Manufacturing Company, Kingsville, are getting out some very nice work and at very favorable prices.

Fannie Furnace will soon go out for repairs.

The Smith Bridge Company, of Toledo, have just finished a Howe truss bridge for the Cincinnati, Wabash and Michigan Road, over the Mississinewa River at Marion, Ind. There are two spans of 140 feet each.

The New York Iron Roofing and Paint Company have recently opened an office and leased a large warehouse at No. 137 East Pearl street, Cincinnati. They are manufacturing Sagendorf's patent self-capping and packed sheet-iron roofing, which is claimed to be water, fire, weather and rust-proof. One of the most important features of this roofing is that no nails are driven through it. They are also sole manufacturers of the "Obelisk" metallic paint. This paint is said to be an effective stop to all leaks in roofs, and is weather and fire-proof. The company are doing a good business, and anticipate a heavy trade.

The Cincinnati Rolling Mill Company have recently purchased the interest of Messrs. Phipps & Harris in the Cincinnati Chain Works, and are erecting a substantial brick building at their mill, 50 x 100 feet, two stories, and putting in the most approved machinery, with the intention of having a first-class chain works of large capacity. They will commence with about 100 forges, and will increase the number as rapidly as possible. They will make chains of all sizes, and are now ready to accept orders for chains of any sizes, from 3-16th

inch to 2-inch iron. The chain works will be under the superintendence of Mr. Jacob Wasmer, who has had large experience in the manufacture of chain. The business will continue under the name of Cincinnati Chain Works. The chains made at these works will be made from strictly selected wrought scrap, especially adapted for chains.

Mr. D. M. Steward, of Cincinnati, is receiving large orders for his newly-improved mechanics' crayons. He has recently increased the capacity of his works. The crayons made at this establishment are manufactured from a very fine quality of soapstone, and are made in a pencil shape, covered with paper. They are used for writing on iron, stone, wood or other materials wherever common or French chalk is used. They have been found to be the best thing for marking on weather stained lumber, and can be used in many places where it is impossible to use a lead or slate pencil. For use in rolling mills they are very superior.

Messrs. Johnson Bros. & Leeper, successors to the old firm of Halliday & Smith, in the hardware business at Cincinnati, have made considerable change in the appearance of the capacious storerooms at Fifth and Central avenue, and have laid in a large and general assortment of mechanics' tools and general hardware and house furnishing goods. They are having a fair trade in builders' hardware this year, with prospects of largely increased business.

The Burgess Steel and Iron Works, at Portsmouth, have recently advertised for skilled non-union workmen for their mill. They have large orders and are determined not to stop their mills on account of strikes or other interference.

ILLINOIS.

Messrs. Vaughan & Bushnell have leased the building adjoining the one occupied by them at present at 108 West Randolph street, Chicago, and are putting in place additional machinery, in order to facilitate the filling of increased number of orders they are constantly receiving for light hardware and tools that they manufacture; they have been given the contract to supply all blacksmith tools, &c., to be used in the new Pullman car shops, at Pullman.

With the additional building, which they have just obtained a lease for, they will have a frontage of 47 feet, running back 135 feet, and three stories in height. At present they employ 35 men from 10 to 14 hours, and contemplate employing an additional force for night work.

J. F. Temple & Son, manufacturers of wood pumps, Chicago, are running to their utmost capacity, and state that they are 2000 pumps behind in their orders.

The Calumet Iron and Steel Company is the title of a newly-organized corporation of this city. The capital stock of the organization is \$2,000,000, and the following are the incorporators: C. R. Cummings, William B. Howard and J. M. Flower.

The Crane Bros. Manufacturing Company report an increase in the manufacture of hoisting and ice machinery. In their three plants they employ 1000 men.

The De Steiger Glass Works, of La Salle, closed for the summer July 1. They have done a successful year's business, their sales amounting to \$350,000.

The Peru Plow Factory is at present closed for repairs.

Charles F. Elmes, manufacturer of machinery, has recently received large orders for coal drills and mining machines.

The Joliet Steel Company have blown out their No. 1 furnace, are relining, and expect to blow in in about four weeks.

Williams, White & Co., of Moline, are busily engaged on orders for drop presses, gear boring and bending machines, for Henry F. Blunt, of Evansville, Ind.; Morrison Bros.' new shops at Fort Madison, Iowa, and a 10-spindle gang boring machine for the Deere & Mansur Company, of Moline. They are also placing in their works, which are run on full time, additional machinists' tools.

The Union Foundry Company is hard at work on the yokes for the new cable system of the South Side Street Railway. They have already expended some \$37,000 in new machinery for the construction of these yokes, and propose still farther to increase their capacity.—*Chicago Industrial World*.

The Harrington & Oglesby Company have been compelled to enlarge their works and add new machinery thereto. Their office, while the alterations are going on, is temporarily located at 51 South Jefferson street. The capacity of these works will be increased fully one-third.

Mr. James F. Duffy, the originator of the Duffy Tool Company, has resigned his active connection with this company, although he is still employed as its consulting engineer. He is devoting most of his time to the tinplate industry.

The Chicago Steel Works shut down one day this week to make some slight repairs. They are now running a full force and turning out a large daily product.

INDIANA.

Brazil Furnace is in blast and making 140 tons a week, but will soon blow out.

KENTUCKY.

Ashland Furnace is continuing doing well, making 50 tons of superior pig metal on raw coal.

TENNESSEE.

The new furnace at Cowan blew in June 14th, and is making 350 tons a week. She is called Sewanee Furnace and is run by the Sewanee Furnace Co.

Clark Furnace, of the La Grange Iron Co., will probably blow in during this month.

MISSOURI.

We clip the following from the St. Louis Age of Steel: The total daily output of the iron works of the Shickel, Harrison & Howard Iron Company is about 100 tons, some 60 or 70 per cent. of which is water and gas pipe. These works give employment to about 400 workmen. The Excelsior Manufacturing Company are now turning out some 80 or 90 of their "Charter Oak" stoves a day, with the prospect of running the number up to 150 a day very soon. Parties in Savannah, Ga., are being furnished with a 100-horse-power stationary steam engine from the David N. Brown Machinery Company, of this city. Wm. Eli-

son & Son, proprietors of the Phoenix Iron Works, of this city, have extended their manufacturing operations to Highland, Ill., where they have started a similar enterprise, known as the Highland Mechanical Works, which consists of a foundry, machine shop, &c., where they are turning out portable and stationary engines, boilers and similar machinery, and do all manner of repairing. The Harrison Wire Works are illuminated at night with electric light.

WISCONSIN.

Minerva Furnace will blow out early in July.

MICHIGAN.

The Malleable Iron Works, situated three miles above Detroit, were damaged by fire on the 4th inst. to the extent of \$15,000. They were insured for \$6000.

The annual report of the St. Louis Bridge and Tunnel Company for the fiscal year ending March 31, 1881, has just been completed. The gross earnings were \$1,138,627.22; the expenses, \$685,537.55, making the net earnings \$453,089.67.

LABOR AND WAGES.

The laborers at the Weshannock Furnace, Newcastle, Pa., struck for eight-hour shifts, which were refused. The old men went to work the same as before they struck, after being idle for a week.

The National Association of Flint Glassware Workers was in session at Wheeling, W. Va., all last week. They met in the State House, and there was a full delegation present.

The laborers in the rolling mill at Scottsdale, Pa., struck for an advance to \$1.50 per day, but they did not get it.

At Wightman's bottle factory, Pittsburgh, it is the rule that a man who is absent when a pot is being set is fined the sum of \$1. At the end of a year the fines thus collected are expended for the benefit of all the employees. This year the amount was \$27, and was expended in cakes, nuts, pop, ice-cream, &c., and a crowd of the employees, to the number of 30 or 40, went up Chartiers Creek and enjoyed the 4th in a sensible manner.

The annual convention of the Amalgamated Association is to be held at Cleveland, Ohio, August 6.

The bricklayers of Pittsburgh, having been conceded their demand of 50 cents per day extra—to \$4—have gone to work.

The tanners of Cincinnati, Ohio, succeeded in obtaining the advance recently demanded by them, and everything is going along smoothly in their business.

The miners at Ramsey's coal works, Martin's Ferry, O., are to have an advance on and after July 15. They are now receiving 65 cents per ton.

A great many men at work in the mills of the country, on account of the extreme heat of the past few days, have been compelled to cease work.

There is no change in the lock out at Cincinnati. All the mills are shut down.

The prices paid in the Connellsville coke regions are about as follows: For mining, 30 cents per wagon of 33½ bushels; for drawing, 60 cents per oven.

The strike at West Middlesex, Pa., for a two weeks' pay, has ended, the firm granting the request of the men.

The laborers at Monongahela Dam No. 3 have struck. The cause of the strike was a reduction from \$2 per day to \$1.75.

The miners of the Connellsville coke region, who have lately been beaten in a strike for lack of organization, as they claim, held a meeting Saturday, the 9th inst., at Everson, Pa. The first matter discussed was that of organization. It being finally determined that the region should be organized, the following was adopted: "Resolved, That this convention being duly called, deem it beneficial to the welfare of the miners and coke drawers of the Connellsville coke district to come under the general direction of General Secretary D. R. Jones." Certain of the miners present were in favor of striking again, and that within 10 days, but this was overruled by the majority of the men present, though another strike was deemed advisable as soon as a perfect organization had been effected. The matter of size of wagons was discussed at length, and the advisability of making the next demand for an advance by the bushel or by the wagon.

The Cincinnati Strike.

The St. Louis Age of Steel, in its issue of July 9, replies to our editorial of June 30, on the charge that the strike at Cincinnati was instigated by the Pittsburgh iron manufacturers, in which it virtually repeats the charge. Omitting the personal part of the article, the balance is as follows:

"While we have refrained from making any direct and positive charge of dishonorable dealing on the part of Pittsburgh iron manufacturers, because we have no direct and positive evidence to sustain it, we but gave voice to what is pretty generally believed in certain circles both in St. Louis and Cincinnati, and which has found frequent utterance, particularly in the newspapers of the latter city. We are in no way responsible for the prevalence of this opinion, and in giving currency to it through these columns we did what we were justified in doing, and what *The Iron Age* would probably do under similar circumstances. In such matters people do not generally demand the production of positive proof and the testimony of eye-witnesses before they form and express their opinions, the subtle influences of surrounding circumstances being generally deemed sufficient for them. Such convictions are worked out in the human mind, we might say involuntarily, and if our belief is that the Pittsburgh manufacturers did what is laid to them, we fail to see why the giving expression to it makes us 'guilty of a dishonorable act,' or why any demands should be made upon us for such amendments as are common among gentlemen. *The Iron Age* says it 'don't believe it.' Why don't it? What better or more convincing testimony has it for its unbelief than the *Age of Steel* and those most interested in the prostrated iron industry in a large section of the country have for a contrivance conviction? If our contemporary is authorized to speak by the card, why don't it come out

in unmistakable language and make a denial? Why don't the Pittsburgh manufacturers do so? They have been invited to do so on several occasions, but they seem to prefer to remain under the obloquy of the insinuation rather than to indignantly deny it. Is it that they cannot truthfully deny it, and hope to evade censure by employing *The Iron Age* to divert public attention by making mouths at us? The *American Manufacturer* speaks of the matter as 'humorous,' and we suppose those who are profiting by the situation view it with much hilarity, and congratulate themselves upon the success of their little scheme, and fairly dance with glee at the enlistment of so staid and respectable a paper as *The Iron Age* as their defender and champion.

It is of no moment whether the charge was made positively and directly or otherwise. The *Age of Steel* gave currency to a charge in which there was not one word of truth, and which has not a shadow of evidence to sustain it. Furthermore, the burden of proof does not devolve upon us. If, in its superserviceable zeal in cultivating what it considers a local interest, a local newspaper circulates or gives currency to a gross libel on the manufacturers of another part of the country, it is not the business of *The Iron Age* to disprove its assertions. They disprove themselves. If our Western contemporary wants any better evidence of the groundlessness of its charge than its inherent absurdity, we can say, on the best authority, that only one person connected with the rolling-mill interest of Cincinnati is known to have held or expressed the idea that the Pittsburgh manufacturers are or have been instrumental in promoting, encouraging or sustaining the Cincinnati strike, and this man is simply a selling agent for the product of one of the mills outside of Cincinnati. We have the authority of the owner of one of the largest Cincinnati mills for saying that the Cincinnati manufacturers do not believe the story in whole or in part. Evidently the "certain circles" in which our Western contemporary gathers its information are not iron circles, and in this matter it is simply lending its columns to spread a silly rumor which no one who knows anything about it believes for a moment. No one with any right to do so has called on or expected the manufacturers of Pittsburgh to deny the charge, and they would be extremely foolish to take any notice of it. What our Western contemporary says of the position of *The Iron Age* in this matter is immaterial.

Exports and Imports for Ten Months of the Fiscal Year.

According to the last summary statement of the imports and exports prepared by the Bureau of Statistics, the value of the dutiable imports for the ten months ended April 30, 1881, was \$350,672,330 for the same period in 1880, \$367,585,451—a falling off of about \$16,913,121. Among the leading dutiable articles imported during the ten months were the following:

IRON AND STEEL.

	1881.	1880.
Pig iron.....	\$6,887,912	\$9,361,640
Bar iron.....	2,223,392	4,041,510
Railroad iron.....	2,483,022	1,347,778
Old and scrap iron.....	5,825,103	8,565,813
Steel, ingots, bars, &c.....	4,444,676	3,135,099
Steel rails.....	4,770,004	7,029,890
Tin in plates.....	11,795,009	14,554,974

The total value of non-dutiable and dutiable imports for the ten months was \$528,213,256 in 1881, and \$542,563,503 in 1880. These imports were brought in as follows:

	1881.	1880.
In cars and other land vehicles.....	\$14,171,102	\$12,587,402
In American vessels.....	202,540,841	220,196,562
In foreign vessels.....	411,503,313	409,783,539

American vessels lost nearly \$18,000,000, while foreign vessels gained nearly \$2,000,000.

During the period indicated the exports of domestic merchandise amounted \$759,744,262 in 1881 and \$688,479,487 in 1880, an increase of \$71,264,775. The following were the values of the leading articles:

	1881.	1880.
Cotton.....	\$222,057,461	\$182,668,841
Wheat.....	143,679,374	161,655,376
Wheat flour.....	37,813,106	29,486,954
Indian corn.....	41,455,538	40,216,481
Horned cattle.....	11,746,045	9,379,203
Bacon and hams.....	55,316,135	41,134,251
Lard.....	29,831,815	22,271,546
Cheese.....	73,220,869	67,281,446
Fresh beef.....	8,276,844	6,057,796
Butter.....	5,607,840	5,266,948
Preserved meats.....	5,389,872	7,243,943
Pork.....	7,298,523	4,010,385
Leaf tobacco.....	16,099,497	14,564,971
Illuminating oil.....	26,379,001	28,671,667

The exports of domestic merchandise for the ten months were carried as follows:

	1881.	1880.
In cars and other land vehicles.....	\$3,969,258	\$3,017,286
In American vessels.....	97,682,353	89,410,911
In foreign vessels.....	658,092,651	596,051,290

Of the \$71,000,000 increase, American vessels gained \$8,200,000 and foreign vessels gained \$62,800,000.

The New York Chamber of Commerce, in their pledge to Mrs. Garfield of "\$250,000 to be presented to her, both as a token of their sincere esteem and sympathy, and as a means of relieving the mind of the President entirely from anxiety with regard to the future of his family," have performed an act worthy of the merchants of New York and creditable to the nation. No tribute could be more fitting or more gracefully bestowed.

According to a bill published in Mexico July 2, all foreign merchandise now free from duty will be subject, on and after the 1st of November, to a duty of 50 cents per 100 kilos, of its weight, petroleum to 80 cents, and other merchandise, besides the ordinary duties, to an additional tax of 75 cents per 100 kilos.

Special Notices.

WANTED.—Engagement with an iron manufacturing firm, either as salesman, agent, superintendent of works, or general business manager. References given when required. Address, E. McMILLIN, Pomeroy, Ohio.

FOR SALE CHEAP.—Foundry, Machine, Blast-furnace, Boiler and Wood Shops, with engine and boiler. Line shafting and pulleys, Mackenzie cupola and blower, forges, &c. Address, E. M. BIRDSELL, Penn Yan, N. Y.

Special Notices.

New and Second-Hand MACHINERY.

One Horizontal Engine, 15½ in. x 30 in. Todd & Rafferty.
One Horizontal Engine, 3 in. x 6 in.
One Beam Corline Engine, 300 H. P.
Portable Engines from 12 to 25 H. P.
Two Horizontal Return Tub. Boilers, 100 h. p. each.
One Hor. Tubular Boiler, 6 ft x 14 ft. 67 4-in. tubes.
Two Hor. Tub. Boilers, 4½ ft. x 14½ ft., 43 4-in. tubes.
One Locomotive Steel Boiler, 30 h. p.

MACHINISTS' TOOLS.

Twelve Lathes, 22 x 12. New.
Ten Lathes, 18 x 8. New.
One Cameron Pump, No. 2.
One Styles & Parker Foot Press.
One Root Gas Exhauster, No. 14.
One Lathe, 24 in. x 13 ft.
One Upright Drill, 32 in. Pond.
One Milling Machine. Pratt & Whitney.
One Milling Machine. Wood & Light.
One Tapping Machine, 6 in. Saunders' Sons.
One Tapping Machine, 1½ in. Saunders' Sons.
One Hydraulic Press, 8 inch ram.
One 300-ton Hydraulic Press and Pump.
One Knowles Special Pump, No. 7.
One Blis & Williams P.O.E. Press.
One Peck, Stow & Wilcox Foot Press.
A large stock of Shafting, Pulleys, Hangers and Miscellaneous Machinery.
One Upright Drill, 36 in. Drill, No. 4. New.
One Hotchkiss Compressed Air Hammer.
Fifty Wrought Iron Vises, all sizes.
One Daniels Planing Machine.
Three pairs Fairbanks' Scales, 2500 lbs. each.
One Pipe Cutting Machine.
One pair Paper Rolls.

J. GRAY'S MACHINERY DEPOT,
37 Dey Street, New York, U. S. A.

TAGGERS IRON.

\$35,000 WANTED for the manufacture of taggers iron and tin, 38 gauge, from a waste material at small cost. Liberal bonus to party organizing company and raising capital. It is a monopoly. No new experiment. Cash sales for goods at large profit as fast as manufactured. Demand unlimited. Money wanted for plant and to extend business. Factory now running.

TAGGERS IRON.

Office of *The Iron Age*, 83 Reade St., New York.

Trip Hammers Wanted.

Parties having good 200 to 300 pound belt helve hammers to dispose of, please address with full particulars, description, price, &c.,

TRIP HAMMERS.

Office of *The Iron Age*, 83 Reade St., New York.

Wanted.

A salesman well posted in cutlery, to sell the Western jobbing trade. An acquaintance with the trade necessary. Address, with references, &c.,

A. J. ALBERT, JR. & CO.,

8 South Charles street, Baltimore.

Wanted.

By a respectable young man, a position as Shipping or Order Clerk, or as a Porter, or in any capacity where he can be usefully employed. Is thoroughly posted in the General Hardware Business, and can furnish the best of references. Address,

F. A. W.

Office of *The Iron Age*, 83 Reade St., New York.

WANTED.—A position as manager or assistant manager of blast furnaces; or a subordinate position where opportunity for promotion exists. The subscriber understands furnace management, business methods, bookkeeping, and sufficient chemistry to analyze furnace stock and to determine the more important elements in iron and steel. References given.

IRON BOX 41.

Office of *The Iron Age*, 83 Reade St., N. Y.

Wanted.

A GOOD SECOND-HAND TRIP HAMMER, suitable for drawing Picks, Mattocks, Grub Hoes, &c. Address, with full particulars,

B. M. C.

Ironton, Ohio.

TO INVENTORS AND MANUFACTURERS.

THE SEMI-CENTENNIAL EXHIBITION OF THE AMERICAN INSTITUTE OF THE CITY OF NEW YORK.

Will open September 14, 1881. Best machinery will be received as early as August 12; other goods, September 8. Intending exhibitors must make early application to secure proper space and classification. For blanks and information address General Secretary, AMERICAN INSTITUTE, New York City.

For Sale.

Hardware Stock and Business.

Located in one of the best towns of Northeastern Pennsylvania. Stock clean, and well assorted, suited to the requirements of the trade where located. Business of 30 years' standing. For terms and full particulars apply to

JAMES S. KURN, Towanda, Pa.

Dissolution.

Notice is hereby given that the partnership heretofore existing between JAMES FERROTTET and WILLIAM J. HOYT, trading as Ferrottet & Hoyt, founders, has been dissolved this day by mutual consent.

The business of the late firm will be settled by WILLIAM J. HOYT, Columbia, Pa.

JAMES FERROTTET, WILLIAM J. HOYT.

The undersigned will continue the foundry and machine business at the old stand, and would be pleased to have the past liberal favors of our customers continued.

JAMES FERROTTET.

Mr. Chas. B. Allen

has an interest in our business from this date.

E. S. WHEELER & CO.

NEW YORK, July 1, 1881.

AN A-1 METALLURGICAL CHEMIST, who has had many years' experience in the management of Blast Furnaces and Iron Foundries, and thoroughly understands the manufacture of Spiegeleisen, is open for an engagement. Address, B. G., Office of *The Iron Age*, 83 Reade St., New York.

Special Notices.

NUT AND BOLT MACHINERY For Sale.

Second-hand Lewis, Oliver & Phillips Header. Pratt & Whitney Tire Blank Header. Also, over **ONE HUNDRED** different sizes and patterns of Bolt Cutters, Tappers, Nut Machines, &c.

The only Specialists in this line in the United States. Patentes and owners of the celebrated National Bolt Cutters.

NATIONAL MACHINERY CO.,
Cleveland, O.

For Sale.

The Little Schuylkill Rolling Mill,

at Milldale, Schuylkill County, Pa., near Port Clinton, on the line of the Philadelphia and Reading Railroad, consisting of a Merchant Bar Mill in complete running order, with a splendid water power sufficient to run the mill two-thirds of the year. Engines, Boilers, Foundry and Machine Shop, with Lathes for turning rolls, and all other appurtenances necessary to commence operation at once. Together with dwellings, stables and large tract of land, to be sold low if applied for soon. For further particulars address or apply to

J. O. RICHARDSON,

No. 232 Dock street, Philadelphia.

For Sale.

PUNCHING, SHEARING, CUTTING, DRAWING & EMBOSING PRESSES.

Presses for Cutting, Drawing and Embossing in one operation, \$500 and upward.

Presses for Punching, Shearing and Cutting, \$250 and upward.

Presses for Punching, Shearing, Cutting and Drawing, \$300 and upward.

Foot Presses, \$35 and upward.

Bench Presses, \$16 and upward.

Soldering Blocks and Machines for Can Bodies, \$5 and upward.

Also all kinds of Fruit and other Can Tools, Dies of all shapes, and Special and General Machinery.

New and Second-Hand Machinery of all kinds bought and sold.

Address or call on

GORDON & LEWIS,

Manufacturers,

235 BROAD ST., COR. 214 NEW ST., PHILADELPHIA, PA.

TO CAPITALISTS.

FOR SALE.

A Rolling Mill and Nail Factory, located on the Pennsylvania Railroad, in the iron and coal region of Pennsylvania, will be sold to close out an estate. The works have a capacity of 6000 tons per annum, are now in first-class running order, and have always done a successful business.

ADMINISTRATOR.

Office of *The Iron Age*, 83 Reade St., New York.

For Sale.

Hardware stock in Western New York. Will sell Hardware without Tin Shop, if desired. Stock clean and in good shape. Will invoice about \$3000. A rare chance, and good reasons for selling.

S. A. M.,

Office of *The Iron Age*, 83 Reade St., New York.

Wanted.

A SALESMAN WELL POSTED IN CUTLERY, to sell to the Southern jobbing trade. Acquaintance with trade necessary. Address

REFERENCE,

Office of *The Iron Age*, 83 Reade St., New York.

Wanted.

By a gentleman of ability and extensive acquaintance, a position as BUYER and GENERAL SUPPLY AGENT for a large first-class manufacturing company. A-1 references. Address

B. Box 65,

Office of *The Iron Age*, 83 Reade St., New York.

Wanted.

A FIRST-CLASS FISHBAR PUNCH, modern build, without engine. Send description, name of maker and price, cash, to

N. A. RAIL MILL CO.

New Albany, Ind.

Partner Wanted

with means, for manufacturing the patent Grappling Bucket and Scale; also Hoisting Bucket and Scale, used for automatically handling coal, grain, earth, dredgings, &c. I am well used to handle large numbers of workmen. References and particulars exchanged.

Address,

61 N. Liberty street, Baltimore, Md.

Wanted.

Non-Union Men to work at Burgess Steel and Iron Works, Portsmouth, Ohio.
Six Puddlers.
One Bar Mill Roller.
One Guide Mill Roller.
One Heater.
One Shingler.

HEAVY IRON WORKS WANTED.

An Eastern Manufacturing Company, doing a profitable business in heavy wrought iron structures, the manufacture and sale of which they control for the United States and Canada, wish to establish additional works, located in the West, South, Pacific Coast and Province of Ontario. Must have first-class freight advantages for receiving rolled structural and merchant iron. Address

WM. O. DOUGLAS, Binghamton, N. Y.

Special Notices.

For Sale.

A Morgan, Williams & Co. 3000 lb. Steam Hammer. Has been used but little, and is as good as new.

Poppett Valve Engine, cylinder 24 inches diameter, 4 ft. stroke; cylinder and bed plate new. Made by Robinson, Rea & Co. Extra heavy for rolling mill work. Bed plate weighs 12 tons. Everything of best workmanship and extra substantial.

Four Housings for 16 in. rolls, with steel screws and screw boxes; all complete.

500-lb. Peck Drop, entirely new; never used.

10-horse power Baxter Engine.

Also three second-hand steam pumps.

One Direct-Acting Niagara Steam Pump, 10-inch stroke. Steam cylinder 9 inches, water cylinder 5 inches diameter.

One Direct-Acting Blake Steam Pump, 15-inch stroke. Steam cylinder 14 inches, water cylinder 12 inches diameter.

One Direct-Acting Blake Steam Pump, 14-inch stroke. Steam cylinder 10 inches, water cylinder 8 inches diameter.

These Pumps are in good working order, and will be sold cheap.

Apply to

OLIVER BROS. & PHILLIPS, Pittsburgh.

FOR SALE.

80 h. p. (15½ in. x 36 in.) Horizontal Engine; two 50 h. p. Andrews Engines, double cylinders; 40 h. p. Upright Boiler; 50 h. p. Horizontal Boiler; Double Cylinder Engine, link motion, 6 in. x 8 in.; Turret Lathe with Chaser Bar; 20 in. x 12 ft. Slide Lathe; 18 in. x 18 in. x 4½ ft. Planer; 3-Column Drill Press; Nos. 1 and 2 Root Blowers.

Address,

A. G. BROOKS & WINEBRENER,

261 N. 3d St., Philadelphia.

For Sale.

ONE LARGE COMBINED PUNCH AND SHEARS. Built to order by Bement. Inquire of

THOMAS LIGGETT,

139 Fourth Ave., Pittsburgh, Pa.

For Sale.

Ten Double Acting Power Punching Presses, A1 order. Eight Single Acting Power Punching Presses, A1 order. Most of the double acting presses are the No. 3 Waterbury Press; the single acting, No. 2. One large Blis & Williams Punching Press. One hundred and twenty-seven Foot Presses in A1 order, most of them square slides. Address, THE GEORGE PLACE MACHINE AGENCY, 121 Chambers and 123 Reade sts., N. Y.

For Sale.

One of the most improved patent rights in Breech-loading Fire Arms. Fires 15 shots per minute. A good working model can be seen or particulars sent on application to

CHAS. FOEHL,

547 New Market St., Philadelphia, Pa.

For Sale.

Stock of hardware, stoves and implements, and store furniture, in one of the best towns in Kansas.

HARDWARE,

Box 366, Salina, Kansas.

For Sale.

ONE RAILROAD LOCOMOTIVE of standard gauge. Cylinders, 13½ by 22; weight, 25 tons. Ready for service.

BOX 87,

Bordentown, N. J.

FOR SALE LOW.—ENGINE.

A Vertical High-Pressure Steam Engine, complete. Cylinder, 24 in. by 48 in. Built by A. J. Sweeney & Son. Can be seen in daily use at our nail factory.

LA BELLE IRON WORKS,

Wheeling, West Va.

ENGINE AND BOILER For Sale.

6 x 14 Horizontal Engine in good condition; also, 15-Horse Power Boiler, Heater, Pump and all other fixtures; all nearly new.

BEECHER & PECK,

Lock Box 122, New Haven, Conn.

NOTICE!

SPECIAL SALE OF

CUTLERY.

SEE ADVERTISEMENT ON PAGE 10

OF BRADFORD & ANTHONY, Boston.

STEEL:

Its History, Manufacture, Properties, and Uses.

1. r. goods, es.	5	534	Sew. mtl., es.	6	100
Clucks, es.	13	198	Mf. iron., pkgs	97	1,155
Tel. mtl., es.					

Hardware.

LY 9.—There has been a quiet market iron since our last, and what business transpired is within the range of our quotations. A fair quotation for No. 1 American iron at the shipping port is \$24, small spot parcels will bring \$26 @ 50 on the wharf in Boston. The feeling which we have recently alluded to, that rock prices have been reached, appears to have gained favor, although it is not forborne that any advance here would lead to eased importations if unaccompanied by a similar rise abroad. We quote *American*

Hardware.

...and rise abroad. We quote *American*

Cold-short.....	21.00 @ 23.00
Red-short.....	24.00 @ 25.00

is a trifle more cheerful, for reasons which are alluded to in other portions of this communication. The shipments for week ending June 18 were 13,537 tons, or about 4000 tons more than the returns for the corresponding week of 1880. This fact has greatly encouraged the speculators and holders of warrants, the inferences drawn by both parties being in favor of a continuance of the preponderance thus shown. The summer months generally count as being the best period of the year for Scotch pig, and there is, naturally, a strong hope that the present summer may prove no exception to the general rule. A considerable quantity of pig is still going from the Clyde to your ports, despite the unfavorable reports we have from your markets. There is a good deal of confusion and mystery on this head

For the purpose of economizing your space I give you the following jottings in a condensed form. The production of pig iron in Cleveland will probably reach 1,350,000 tons in the half year from 120 furnaces—about 100,000 tons in excess of any previous six months. Cyfartha will have steel works on a large scale near the old iron works, and the Spanish ore is already being piled up. No deaths have taken place during the year at British manufactories of explosives. During May 38,273 emigrants left Liverpool in 90 ships—32,203 going to the United States and 5799 to British North America. Mr. B. Holland, late of Brown, Bayley & Dixon, Sheffield, has become works manager of the Ebbw Vale Company. The Clyde blast furnaces in Scotland are, it is stated, about to be blown out. Siemens plant has been put down at the Exhibition Steel Works, near Middlesbore. Exhibitions are open at Clev, Frankfort, Halle, Brunswick and Stuttgart, in Germany. American goods being shown at each. The Board of Trade consents to allow the use of compressed-air engines on the Stratford (N. E. London) line of tramways. The Blenauw Steel and Iron Company, Limited, declares an interim dividend at the rate of 5 per cent. for the half year. The Rhyneym Iron Com-

(Koch & Vlierboom.)

ROTTERDAM, June 21, 1881.—*Tin*.—There is a very firm feeling. Billiton has been paid on the spot as high as 55 guilders per 50 kilos.; the asking price to-day is 55.25 for Banca and 55 for Billiton; there are buyers at 25¢ less. F. S.—June 28. Has been dull and inactive during the week. Banca may now be had at 54.50 and Billiton at 54.25; at 25¢ less there would probably be buyers. The 130,000 piculs Billiton sold at Batavia 21st inst., averaged 61.64 guilders per picul.

A new invention for coating iron and steel with iridescent copper, says the *Revue Polytechnique*, is the work of Dr. Weil, of Paris. First, 35 parts of crystallized sulphate, or an equivalent amount of any other salt of copper, are precipitated as hydrated oxide by means of caustic soda or some other suitable alkaline base; this oxide of copper is to be added to a solution of 150 parts of Rochelle salts, and dissolved in 1000 parts of water; to this 60 parts of best caustic soda, containing about 70 per cent. NaO , is to be added, when a clear solution of copper will be formed. The object to be coppered is to be cleaned with a scratch-brush in an alkalino-organic bath, attached as a cathode, immersed in the coppering bath, and treated with the usual precautions, when it will become rapidly coated with an adherent film of metallic copper. As the bath gradually loses its copper oxide of copper, as above prepared, should be added, to maintain it in a condition of activity, but the quantity of copper introduced should not ordinarily exceed that above prescribed, as compared with the quantity of tartaric acid the bath may contain. If the quantity of copper notably exceeds this proportion, certain metallic irisations are produced on the surface of the object. These effects may be employed for ornamental and artistic purposes. According to the time of the immersion, the

strength of the current and the proportion of copper to the tartaric acid, the iridescences may be produced of different shades and tints, which may be varied or intermingled by shielding certain parts of the object by an impermeable coating of paraffine or varnish, while the iridescent effect is being produced on the parts left exposed. All colors, from that of brass to bronze, scarlet, blue and green may thus be produced at will.

What Carelessness Costs.

The report of the New York Board of Fire Commissioners for 1880 is just issued, and although not quite as exciting or romantic as the average novel, the record is one that Charles Lamb would characterize as being full of fire from beginning to end. With the departmental details which make up most of the material of the report we do not now purpose to concern ourselves. But there is one feature of the document which deserves special attention, and this is the tabulated experience of the city of New York in the matter of fires since 1866, together with a careful compilation of the causes of these fires since 1868, so far as it was possible to ascertain them. These statistics of the number, causes and effects of our local fires during this long period make up a record of costly carelessness which ought to be emphatic in suggesting the inquiry whether this sort of thing must be hopelessly accepted as beyond remedy or reform.

Among the many causes of fires in this city from June 1, 1868, to January 1, 1881, the following are those which appear to have been most active, frequent and numerous. We give the aggregate number of fires traced to the causes named during the period mentioned above:

Accidental, or not ascertained.....	346
Carelessness of occupants with matches, lights, cigars, hot ashes, &c.....	4,080
Children playing with matches, &c.....	889
Defective flues, furnaces, &c.....	689
Defective arrangement of stoves, &c.....	295
Escaped gas lighting.....	345
Fat, varnish, &c., boiling over.....	323
Foul chimneys.....	1,729
Fireworks.....	486
Heat from grates, steam pipes, &c.....	138
Hot coals from stoves and grates.....	347
Incendiary, or supposed incendiary.....	1,367
Kerosene oil lamps falling.....	280
Malicious mischief.....	865
Not ascertained.....	858
Overheated stoves, pipes, &c.....	900
Sparks from chimneys, engines, &c.....	493
Spontaneous combustion.....	93
Vapor of naphtha, gasoline, &c.....	907
Window curtains, &c., fired by gas jets.....	907

During the period covered by the above enumeration, there have been about 17,500 fires in this city. Of these 17,500 fires, nearly 90 per cent., or 15,316, are accounted for under the 19 causes above mentioned, less than 5 per cent. (865) are classed as "not ascertained," and the remaining 1,319 fires are chargeable upon some eighty varieties of origin. It is noteworthy, therefore, that if we leave out "incendiary" and "malicious mischief," there is scarcely a cause given for all these fires which might not properly be specified as carelessness, pure and simple, either on the part of the owner or occupant, or else of some equally careless outsider.

In point of fact, it is difficult to assign the great bulk of these fires to anything else than carelessness or the lack of due precaution; for even the entire century of causes so laboriously specified in the tables brings us back to the point that, with a reasonable degree of vigilance on somebody's part, nine-tenths of all these fires might have been easily prevented, at a saving of \$45,000,000.

The trouble is that New York is not at all a singular sinner in this respect. Just this same reckless carelessness characterizes our people wherever located. And if the statistics were gathered in the several States, as they should be, but are not (with the exception of Massachusetts), we would easily see how nine-tenths of all the causes of American fires resolve themselves into the one controlling cause—carelessness. Construction is faulty; but so much the more reason why extraordinary precautions and vigilance should be exercised. And so on through the list of reasons that may be given why we have so many fires. The reasons are intelligible enough and plentiful enough; but then they are only so much the more reason why everybody should be on guard personally or by deputy, first to prevent fires and next to put them out at the start. But because we will not invest time, trouble or thought in this matter of precaution, the country must trade off \$100,000,000 worth of good property every year for a worthless heap of ashes, and pay some \$30,000,000 a year for fire departments and their incidents—to say nothing of the \$25,000,000 also expended annually on the underwriting machinery whereby indemnity is provided for the provident policy-holder. Thus carelessness becomes a costly national habit which, as much as any other, tends in a ruinous direction.

A Mammoth Engineering Project.—The St. Louis Republican says: Lake Mackenzie is one of those "possibilities of North America" recently suggested. The lake would result from a proposed closing of the northerly outlet of the valley of Mackenzie River at the line of 68 degrees north, and storing up the water of 1,200,000 square miles. And to this could be added the water of other large areas. It would be a lake of about 2000 miles in length by about 200 of average width. Its surface would have an altitude of about 650 feet above sea level. It would cover with one continuous surface the labyrinth of streams and lakes which now occupy the Mackenzie valley. It would be a never-failing feeder for the Mississippi. It would connect with Hudson Bay and with the "great lakes," and also with the interior of Alaska by connecting with the Yukon and its affluents. By concurrent results and other "possibilities" it would become, during some months of each year, a navigable water, adding not less than 12,000 miles of communication to the Mississippi. It would complete the interior lines of river courses by connecting them. Cutting the "divide" which now exists between the Mississippi and Mackenzie would do this. This work is small when measured by its results, and it becomes easy of accomplishment under the methods proposed. The connection of the

upper Mississippi with the proposed Lake Mackenzie could be easily made. The outflow from such a lake, having a length of more than 2000 miles from south to north, and draining a very wide range of altitudes and latitudes, would be a timely and enduring one. This lake would make possible and easy the straightening of the lower Mississippi. It would also contribute to the proposed ship channel from Cairo, Ill., to the Gulf of St. Lawrence, by the almost straight line which cuts the Wabash Valley, the lakes Erie and Ontario and the lower St. Lawrence.

Arizona Copper Mines.

A correspondent of the San Francisco Bulletin, writing recently from Tucson, says: The copper interests of the Territory are attracting great attention at present, and good copper mines and prospects are eagerly sought after by our resident capitalists, as well as by strangers in our gates. The famous Copper Queen mine, of Bisbee, the representative copper mine in the territory, which bears the same relation to copper mines that the Contention mine of Tombstone bears to the silver mines, has paid its fortunate owners, Messrs. W. H. Martin & Co., of San Francisco, the well-known sea-wall contractors, the handsome dividend of \$100,000 per month for the past four months. A recent careful examination of the mine, made by John R. James, of Tucson, a recognized authority on copper, shows that \$1,925,000 are in sight, estimating copper at 19 cents per pound. The original cost of this mine was \$30,000. A furnace was erected at a cost of \$11,000, making the total cost of mine and plant fall inside of \$50,000. The success of the Copper Queen has stimulated the development of copper properties in other sections of the territory, and scarcely a day passes without reports of new strikes and big finds of this most valuable metal. The latest transfer of copper properties was made recently to Mr. Christopher and other California capitalists, by O. A. Hyatt and others, of the Apache, Midas, and St. Nicholas mines, lying on the easterly slope of the Santa Catalina Mountains, and situated about 55 miles from Tucson. The mines have an elevation of about 7500 feet, and the vein lies between limestone and porphyry, the limestone being the overlying formation. The ores are found in the shape of carbonates and sulphates, the carbonates predominating. The average assays show 30 per cent. in copper and \$20 in silver per ton. On the Apache location a cross-cut has now penetrated the vein for 15 feet in ore of the above description, and the hanging wall of the vein has not yet been encountered. The ledge has been uncovered on the surface for 60 feet, and has been traced the whole length of the claim, 1500 feet. Some specimens of copper ore taken from the cut assay as high as 70 per cent. The Midas and St. Nicholas claims are extensions of the Apache, and show the same characteristics. Charcoal is abundant, and can be furnished for 15 cents per bushel. Water rights have been secured, and the cost of smelting should not exceed \$10 per ton. As 30 per cent. copper ore is worth \$60 per ton, there is a large margin of profit in smelting the ores on the ground. Yellow pine abounds, and this variety of timber makes the best charcoal known to the smelter. The climate is good all the year round. A good road can be constructed from the railroad track to the mines at an expense not to exceed \$3000. The ores are free-smelting, and there are no real reasons why the success of Bisbee should not be repeated at an early day in the Santa Catalinas.

The Substitution of Steel for Iron and Iron for Wood in Car Construction.

The following is the report on this subject presented at the recent convention of the Master Car Builders' Association:

To the President and Members of the Master Car Builders' Association.—GENTLEMEN: Your Committee on the "Substitution of Steel for Iron and Iron for Wood in Car Construction" present the following report:

Although the past year has been one of great activity in car construction, we are not able to report rapid progress in the substitution of iron for wood or steel for iron in the building of cars. The overwhelming desire for "cheap cars" seems to blind the eyes of the railway officials to the fact that the sudden increase of load in freight cars from 10 to 20 tons has changed many of the conditions of freight transportation. The car that did very well to carry 10 tons (the load for which they were planned) prove unable to carry 20 tons, and are being rapidly crushed out of existence. Wood that served well the purpose with 10 tons of load is insufficient to bear the hammering of 20 tons. The problem is forced upon us whether we will or not; we must consider the question of this substitution and that very speedily. There is another item in this question important to consider, and that is the rapid stripping off the timber supply of all kinds. Experts tell us that the consumption of American timber in 1880 amounted to 20,000,000,000 feet. The vastness of this quantity the broadest mind cannot at all comprehend. When the yearly consumption was one-tenth of what it now is, our fathers feared a famine of wood. In the face of these alarming facts can we afford to shut our eyes and drift along?

Iron body bolsters have been adopted by a number of important lines, and thus far we have heard no complaint. Perhaps the opponents may say it is too soon to report them a success. We submit that several years' experience should have developed bad features ere this. We do not claim that perfection in form and proportions has been reached. In fact, when we find 500 pounds of iron in two of them we fear some of the brethren may have omitted to consult the tables giving the working strength of iron when planning their iron bolsters.

Although the iron trucks have not been introduced as rapidly as the most sanguine have desired, yet all must admit that the progress has been about as great as could have been expected under the circumstances.

New forms are being thought out and tested, and in the end it may be found well that the process of substitution was not more rapid than it has been. We learn of some extensive preparations for building car trucks and beds almost entirely of iron, and ere another convention assemblies we may see important progress in this direction.

The high-priced ideas of steel manufacturers is interfering materially with steel taking the place of iron in car construction. We regret this, as we are persuaded in many things a saving of weight might be effected without lessening the strength did not high prices bar the way. We would respectfully request our steel manufacturers to consider this matter and help us with low-priced mild steel for car work, and thus open up a large demand for steel where now it is not used.

W. R. DAVENPORT,
JOHN KIRBY.

Supremacy in Manufactures.

The Philadelphia North American says: Although the United States census returns of manufacturing industry have long been completed and published as regards the city of Philadelphia, those of New York city are still imperfect. But on the strength of estimates that the annual production of the latter in 1880 was about \$500,000,000, the assumption is made that New York is supreme in manufactures, as she undoubtedly is in domestic trade, foreign commerce, finance, exchanges and wealth. Of course it would not be extraordinary if this were true, since in all civilized nations the leading city is always a powerful emporium of domestic manufactures, because it affords the largest and best market. But in the case of New York the trading interests have been so conspicuously and overwhelmingly foreign, as to excite a natural curiosity to know by what process domestic manufactures became so strong there. No doubt the very fact of New York being so noisy and troublesome on the subject of protection, must have incited the domestic interests to endeavor to control that great market by centralization of capital and by organized effort, precisely as similar competition was successful in the principal cities of the West and South. New York also offered many advantages in the enormous supplies of labor, capital and raw materials. Yet these were counterbalanced by the exaggerated cost of living, rents, salaries, labor, &c., and thus manufactures flourished for a long time all over New England, New York State, New Jersey and Pennsylvania better than in New York city. It is only since 1860 that industrial operations have been potential in the Empire city. In that period Philadelphia assumed and held the championship of domestic interests, and succeeded in nationalizing and giving permanence to industrial ambition. The immense internal development of the Republic naturally turned inward the superabundant activity and enterprise of New York, so that if we include all the outlying suburbs of that city the aggregation of manufacturing industry in and around that center is really vast and wonderful. But for this consummation we take to ourselves in Philadelphia a very considerable share of the influence that has led to such grand results, for there has been a city able at all times to challenge comparison with New York, built up almost entirely by domestic manufactures, and possessing but a limited share of the foreign commerce of the republic, and a city, too, which in contrast with New York has for half a century provided better dwelling places for the inhabitants, and which occupies a decidedly higher position in the scale of average diffusion of the blessings of civilization among the masses of her people. As to the point whether New York is really ahead of Philadelphia in productive industry, we do not consider it worthy of discussion, since we cheerfully admit that the outlying suburbs of New York are so vast and wonderful in their development that their industry, added to that of New York, would at the present time overshadow that of Philadelphia. Yet still we do not surrender our claims to the leadership of manufacturing industry; for however great that interest may be in New York, it has manifestly failed to give color to the sentiment of the community, and is there regarded as a minor interest in view of the magnitude of the foreign commerce, while in Philadelphia productive industry overshadows everything else.

Boiler Insurance in Philadelphia.

The Hartford Steam Boiler Inspection and Insurance Company have instructed their agents in Philadelphia not to approve boilers with flat cast-iron heads with a greater diameter than 36 inches, and then heads of that diameter are not to be approved unless of proper thickness. They are further instructed to use their influence to gradually bring the company's business into such condition that no boilers shall be under their care which have cast-iron heads of greater diameter than 32 inches. Concave heads, which they believe to be the best form for cast iron, are not under criticism. They do not wish this action to be construed as indicating a desire not to accommodate manufacturers, but in view of the recent verdict of the coroner's jury in the case of the explosion at the dye works of Gaffney & Dolen, they do not care to continue writing on this class of boilers.

Mr. Coleman Sellers is reported by the Philadelphia Times as saying: I see that some one has introduced an ordinance in Councils forbidding the use of cast-iron boilers. I wish to rub in the fact that that is sheer nonsense. Cast iron is just as good as any other iron in boilers. Some of the highest authorities say that it is better than any other kind. It all depends on how you use it. We have a cast-iron boiler that we use for testing injectors, because it will stand a higher pressure than a wrought-iron boiler. If you subject a cast-iron boiler-head to the same annealing process that a car wheel is subjected to, it will not explode. Take a car wheel out of the mold and lay it on wet sand and it will crack. Let it cool off in

the open air and it will break easily; but put it in an oven and keep it red hot for two or three days, and let it cool gradually, it is almost unbreakable. The same is true of boiler-heads.

METALLURGICAL NOTES.

ON MANGANESE IN STEEL.

Mr. Sergius Korn, of St. Petersburg, has contributed the following to *Chemical News*: Many works using inferior materials for the production of cast steel, either by the Bessemer or open-hearth processes, add a notable quantity of spiegeleisen, or ferro-manganese; in steel cast by such works, some 0.60 to 1.00 per cent. of manganese is often detected. Certainly, such a steel is good for many purposes, but in some cases (as for the preparation of plates for boiler making and shipbuilding) it is a serious question whether it is proper to use such a material, the corrosive property of which is very high and bending test bad. The author believes that inspectors, before passing plates for the above-mentioned purposes, should be instructed to make acquaintance with the chemical composition of the steel; by such means much confusion may be avoided. Some Bessemer steel-plates for boilers, on being analyzed, gave the following results:

	Per cent.
Carbon.....	0.18
Manganese.....	0.65
Iron.....	0.24
But in respect to the bending tests, these Bessemer and Siemens-Martin plates behaved quite differently, plainly showing the hardening effects of manganese:	

A.—BESSEMER PLATES.	
Specimen reheated and cooled in sand.....	Bent double.
Specimen heated to a yellow heat and cooled in water.....	Broke at a bend of 25°.

B.—SIEMENS-MARTIN PLATES.	
Specimen reheated and cooled in sand.....	Bent double.
Specimen heated to a yellow heat and cooled in water.....	Bent double.

It must be added that the contents of silicon, sulphur and phosphorus were, on the average, nearly the same, both in Bessemer and Siemens-Martin steel.

Steel Plates in Russia.—According to the regulations now in force at the Russian government yards, the steel plates there used for shipbuilding or boiler-making purposes are to be rolled from ingots containing from 0.18 to 0.22 per cent. of carbon, and in the case of the plates for boiler-making, the test samples have to stand a tensile strain of not less than 26 or more than 30 tons per square inch, and must elongate 20 per cent. in a length of 8 inches before fracture. Shipbuilding plates must have a breaking strain of between 26 and 31 tons per square inch, and must elongate not less than 17 per cent. in a length of 8 inches. The hot and cold bending tests are the same as those of the English Admiralty for iron, but in the case of the cold bending tests the samples are to be placed for 20 to 30 minutes in a cooling mixture, giving a temperature of about zero Fahrenheit, and after this they must bend to the same angle as is required for iron at the ordinary temperature.

New Outlets for Connellsville Coke.—Mr. Vanderbilt has made arrangements to enter the Connellsville coke regions with his system of roads. These now enter Pittsburgh over the Pittsburgh and Lake Erie, and from Pittsburgh a new line will be built extending up the Monongahela River to McKeesport, where that stream is crossed and the Youghiogheny followed for 45 miles up the left bank to New Haven, opposite Connellsville. The line will be 60 miles long. It will be put under contract at once, and it is hoped it will be finished in 12 months. This road will be of great importance to Pittsburgh. The rate on coke at present to that city is quite high for that class of freight, but, with this new road, competition will make a reasonable rate, and in so far benefit not only the furnaces of Pittsburgh, but those further west.

The following is a record of the furnaces in and out of blast in Great Britain on March 31:

Location of Furnaces.	Furnaces built.			Furnaces in blast.		
	June 30, 1880.	Dec. 31, 1880.	March 31, 1881.	June 30, 1880.	Dec. 31, 1880.	March 31, 1881.
England:						
Cumberland.....	52	54	54	36	42	43
Derbyshire.....	54	57	57	39	43	40
Durham.....	59	60	60	25	26	26
Gloucestershire.....	9	9	9	2	2	2
Hampshire.....	1	1	1	0	0	0
Lincolnshire.....	18	18	18	14	15	16
Lancashire.....	51	51	51	34	33	31
Northamptonshire.....	23	25	25	16	17	15
Northumberland.....	4	4	4	4	4	4
Staffordshire, South.....	146	146	146	43	44	44
Staffordshire, North.....	37	36	36	21	23	22
Somersetshire.....	1	1	1	1	1	1
Sussex.....	25	25	25	12	11	11
Wiltshire.....	7	7	7	3	3	3
Yorkshire, West Ridg.....	48	49	51	31	31	31
Yorkshire, North Ridg.....	101	101	101	62	60	60
Wales:						
North.....	10	10	10	7	6	6
South.....	148	151	151	73	74	77
Scotland.....	150	151	151	116	124	120
Total.....	947	959	958	559	590	575

A number of gold beaters arrived in Philadelphia last week from London, having been engaged to succeed a number of strikers, but they were met at the wharf by a deputation from New York, by whom they were supplied with tickets for a return voyage—and they returned.

Mr. Hamilton Diston, of Philadelphia, on Tuesday last made the first payment of

\$200,000 on the 4,000,000 acres of land recently purchased by him from the State of Florida.

The very latest news from Chili, dated Valparaiso, June 2, announces that an arrangement has been perfected with the Argentine Republic by which the vexed question of territorial limits is to be finally settled. According to the protocol, Chili will retain possession of the Straits of Magellan, and the Argentine Republic is declared proprietor of Patagonia. Other minor questions are left to arbitration.

Mr. Jay Gould's new Atlantic cable is now in working order, but business will not be commenced at once, the ostensible reason being that certain "tests" are still to be applied. As Mr. Field has predicted a big fight, it is possible that Mr. Gould is testing his competitors as well as his wires. Speaking of cables, this last one was made and put down with considerable less fuss than the original.

Railroad traffic for the month of June was remarkably heavy. The gross earnings of 41 roads for the month were over \$17,000,000, a gain over last year of about \$4,000,000, the number of miles operated this year having been 32,119, against 28,606 in 1880. From January 1 to June 30 the earnings of 43 roads are reported at \$102,171,690, an increase over the same period last year of \$12,491,161.

A tram car has been driven in Paris by means of Faure's accumulators. It conveyed 40 persons at the rate of 6 miles an hour, the motive power being 160 Faure batteries, weighing 18 pounds each, altogether 2880 pounds—a nice little load. It is naively stated that the work could have been done by two horses.

The Peruvians, up to June 10, had not been able to unite in forming a provisional government, but not for lack of a quorum.

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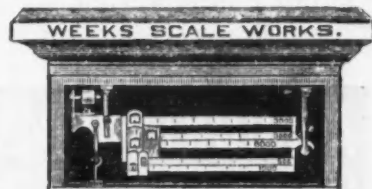
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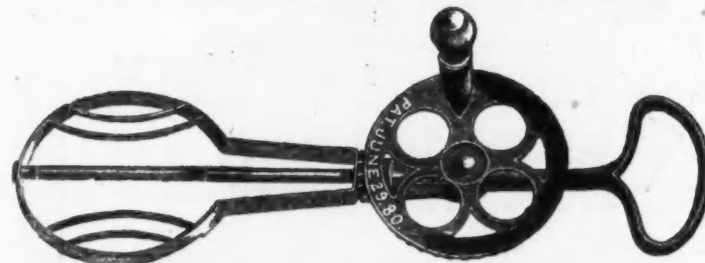
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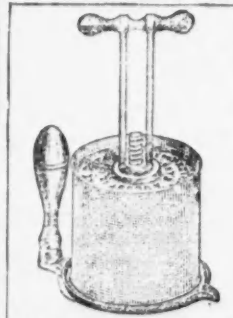


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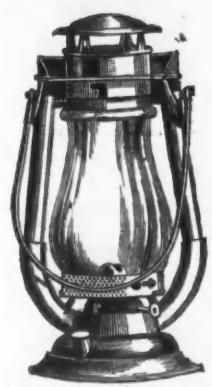
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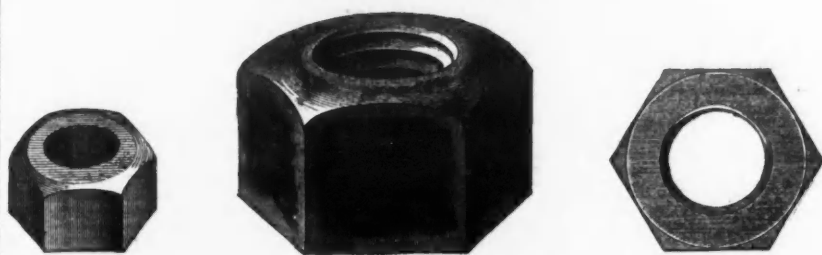
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Office of **NELSON LYON,**
SOLE MANUFACTURER OF
**Lyon's Patent Metallic
Heel Stiffeners,
Also, Manufacturer of
BRUSHES**
Of Every Description,
Nos. 17 & 19 Green St.,
Albany, N. Y., Dec. 8, 1880.

To All Whom it May Concern:

To-day a decree in my suit against G. T. Fisher & Co., of Detroit, for an infringement of my patent, was made and entered, of which the following is an extract:
At a session of the Circuit Court of the United States for the Eastern District of Michigan, held at Detroit, &c., on Wednesday, the 8th day of December, 1880.

NELSON LYON
against
GUYON T. FISHER, et al.

It is ordered, adjudged and decreed, that the act entitled "An act for the relief of Nelson Lyon and Jeremiah S. James," passed by Congress and approved April 1, 1880, &c., is a good, valid and constitutional act.

That the original patent, bearing date July 9, 1872, and numbered 1284, granted and issued to Joseph Barsaloux, Jeremiah S. James and Nelson Lyon, when corrected by the Acting Commissioner of Patents, is directed by said act, was a good and valid patent.

That the said Joseph Barsaloux was the original and first inventor of the improvements in metallic stiffeners for boots and shoe heels mentioned and described in said letters patent.

That the Released Letters Patent No. 919, dated Mar. 11, 1880, granted to said Nelson Lyon for an improvement in metallic heel stiffeners for boots and shoes, originally patented as aforesaid, is a good and valid patent; that said Lyon is exclusively possessed of said Letters Patent and the invention thereby secured.

That the defendants, G. T. Fisher & Co., and each of them, have infringed upon the said patents and upon the exclusive rights of said Lyon under the same.

That said Lyon receive of said defendants all the profits, &c. they have made, and in addition thereto all the damage he has suffered by reason of the infringements by the defendants, and also the costs, charges and disbursements in the action.

It is also further ordered, adjudged and decreed, that a perpetual injunction be issued against said defendants, according to the prayer of the said complainant's bill.

You are also hereby notified that the perpetual injunction has been issued and served on the defendants.

All questions as to damages and settlements in relation to infringements under my patents must be addressed to and made with my attorney, **WILLIAM H. KING**, in my care at the above address.

NELSON LYON.

Wilson Bohannon,
Manufacturer of Patent
BRASS PAD LOCKS
For Railroad Switches, Freight Cars, and the Hardware Trade. All sizes, with Brass and Steel Keys, with and without chains.
Patent Horizontal Rim Cylinder Night Latch.
Self-adjusting to doors of any thickness, with Patent Stop and Drawer Back Knob
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PASSENGER CAR LOCKS, Bronzed, Nickel-Plated and Japanned
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Bridgeport.....dis 20 2 5
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Frank, new list, Jan. 1, 1891.....dis 20 2 5
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Norwalk.....dis 10 20 5
R. & F. Corbin.....List of prices, with changes
Russell & Erwin.....of Dec. 1, 1885, and April
Cordis.....19, 1891, dis 45 2 5
Reading Hardware Co.
Trenton Lock Co.
Padlocks.....dis 10 20 5
Mallory, Wheeler & Co.....dis 10 20 5
Wm. Wilcox & Co.....dis 10 20 5
"A. E. Detroit".....dis 10 20 5
Romer's.....dis 10 20 5
Conestoga.....dis 10 20 5
"A. E. Dietz".....dis 10 20 5
Lustr-o-A-Z, bottles, per doz, \$2; per gro, \$18 25
Mallets-Hickory.....dis 10 20 5
Cordis.....dis 10 20 5
Penfold Block Co., Lig., Apple & Hickory.....dis 30 5
Meat Cutters.
Dixon's (P. S. & W.), Nos. 1.....dis 10 20 5
Miles' Challenge.....dis 10 20 5
Perry's No. 1.....dis 10 20 5
Each.....\$5.00, \$6.00, \$7.00, \$8.00, \$9.00, \$10.00, \$11.00, \$12.00, \$13.00, \$14.00, \$15.00, \$16.00, \$17.00, \$18.00, \$19.00, \$20.00, \$21.00, \$22.00, \$23.00, \$24.00, \$25.00, \$26.00, \$27.00, \$28.00, \$29.00, \$30.00, \$31.00, \$32.00, \$33.00, \$34.00, \$35.00, \$36.00, \$37.00, \$38.00, \$39.00, \$40.00, \$41.00, \$42.00, \$43.00, \$44.00, \$45.00, \$46.00, \$47.00, \$48.00, \$49.00, \$50.00, \$51.00, \$52.00, \$53.00, \$54.00, \$55.00, \$56.00, \$57.00, \$58.00, \$59.00, \$60.00, \$61.00, \$62.00, \$63.00, \$64.00, \$65.00, \$66.00, \$67.00, \$68.00, \$69.00, \$70.00, \$71.00, \$72.00, \$73.00, \$74.00, \$75.00, \$76.00, \$77.00, \$78.00, \$79.00, \$80.00, \$81.00, \$82.00, \$83.00, \$84.00, \$85.00, \$86.00, \$87.00, \$88.00, \$89.00, \$90.00, \$91.00, \$92.00, \$93.00, \$94.00, \$95.00, \$96.00, \$97.00, \$98.00, \$99.00, \$100.00, \$101.00, \$102.00, \$103.00, \$104.00, \$105.00, \$106.00, \$107.00, \$108.00, \$109.00, \$110.00, \$111.00, \$112.00, \$113.00, \$114.00, \$115.00, \$116.00, \$117.00, \$118.00, \$119.00, \$120.00, \$121.00, \$122.00, \$123.00, \$124.00, \$125.00, \$126.00, \$127.00, \$128.00, \$129.00, \$130.00, \$131.00, \$132.00, \$133.00, \$134.00, \$135.00, \$136.00, \$137.00, \$138.00, \$139.00, \$140.00, \$141.00, \$142.00, \$143.00, \$144.00, \$145.00, \$146.00, \$147.00, \$148.00, \$149.00, \$150.00, \$151.00, \$152.00, \$153.00, \$154.00, \$155.00, \$156.00, \$157.00, \$158.00, \$159.00, \$160.00, \$161.00, \$162.00, \$163.00, \$164.00, \$165.00, \$166.00, \$167.00, \$168.00, \$169.00, \$170.00, \$171.00, \$172.00, \$173.00, \$174.00, \$175.00, \$176.00, \$177.00, \$178.00, \$179.00, \$180.00, \$181.00, \$182.00, \$183.00, \$184.00, \$185.00, \$186.00, \$187.00, \$188.00, \$189.00, \$190.00, \$191.00, \$192.00, \$193.00, \$194.00, \$195.00, \$196.00, \$197.00, \$198.00, \$199.00, \$200.00, \$201.00, \$202.00, \$203.00, \$204.00, \$205.00, \$206.00, \$207.00, \$208.00, \$209.00, \$210.00, \$211.00, \$212.00, \$213.00, \$214.00, \$215.00, \$216.00, \$217.00, \$218.00, \$219.00, \$220.00, \$221.00, \$222.00, \$223.00, \$224.00, \$225.00, \$226.00, \$227.00, \$228.00, \$229.00, \$230.00, \$231.00, \$232.00, \$233.00, \$234.00, \$235.00, \$236.00, \$237.00, \$238.00, \$239.00, \$240.00, \$241.00, \$242.00, \$243.00, \$244.00, \$245.00, \$246.00, \$247.00, \$248.00, \$249.00, \$250.00, \$251.00, \$252.00, \$253.00, \$254.00, \$255.00, \$256.00, \$257.00, \$258.00, \$259.00, \$260.00, \$261.00, \$262.00, \$263.00, \$264.00, \$265.00, \$266.00, \$267.00, \$268.00, \$269.00, \$270.00, \$271.00, \$272.00, \$273.00, \$274.00, \$275.00, \$276.00, \$277.00, \$278.00, \$279.00, \$280.00, \$281.00, \$282.00, \$283.00, \$284.00, \$285.00, \$286.00, \$287.00, \$288.00, \$289.00, \$290.00, \$291.00, \$292.00, \$293.00, \$294.00, \$295.00, \$296.00, \$297.00, \$298.00, \$299.00, \$300.00, \$301.00, \$302.00, \$303.00, \$304.00, \$305.00, \$306.00, \$307.00, \$308.00, \$309.00, \$310.00, \$311.00, \$312.00, \$313.00, \$314.00, \$315.00, \$316.00, \$317.00, \$318.00, \$319.00, \$320.00, \$321.00, \$322.00, \$323.00, \$324.00, \$325.00, \$326.00, \$327.00, \$328.00, \$329.00, \$330.00, \$331.00, \$332.00, \$333.00, \$334.00, \$335.00, \$336.00, \$337.00, \$338.00, \$339.00, \$340.00, \$341.00, \$342.00, \$343.00, \$344.00, \$345.00, \$346.00, \$347.00, \$348.00, \$349.00, \$350.00, \$351.00, \$352.00, \$353.00, \$354.00, \$355.00, \$356.00, \$357.00, \$358.00, \$359.00, \$360.00, \$361.00, \$362.00, \$363.00, \$364.00, \$365.00, \$366.00, \$367.00, \$368.00, \$369.00, \$370.00, \$371.00, \$372.00, \$373.00, \$374.00, \$375.00, \$376.00, \$377.00, \$378.00, \$379.00, \$380.00, \$381.00, \$382.00, \$383.00, \$384.00, \$385.00, \$386.00, \$387.00, \$388.00, \$389.00, \$390.00, \$391.00, \$392.00, \$393.00, \$394.00, \$395.00, \$396.00, \$397.00, \$398.00, \$399.00, \$400.00, \$401.00, \$402.00, \$403.00, \$404.00, \$405.00, \$406.00, \$407.00, \$408.00, \$409.00, \$410.00, \$411.00

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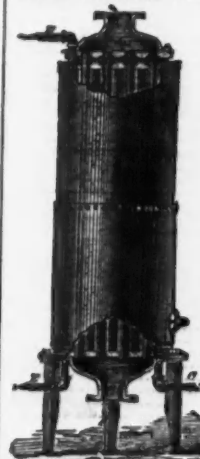
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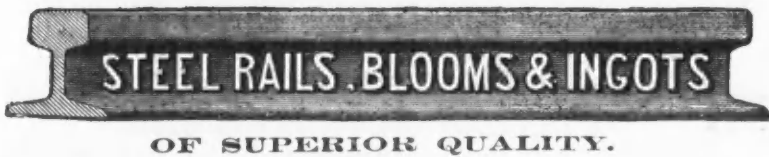


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MANUFACTURERS OF

MERCHANT BAR IRON,

Skelp Iron, Splice Bars, Railway Track Bolts, Car, Bridge,
and Machinery Bolts, Nuts, &c.

We invite the attention of RAILROAD MEN especially to our make of SPLICE BARS and Track Bolts. Using the best brands of REFINED IRON, and paying close attention to the finish of our manufactures, we are enabled to offer our patrons BOLTS, NUTS, SPLICE BARS, &c., of excellent quality. Our works have been enlarged within a few years; all orders are now executed with promptness; all our work guaranteed.

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ELBA IRON & BOLT CO., Limited, Pittsburgh, Pa.

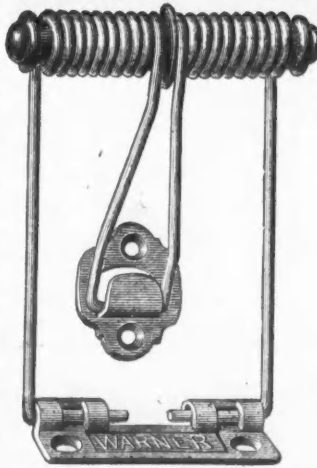
BELLAIRE NAIL WORKS,

PIG IRON AND NAILS,

Manufacture the Celebrated Brand of

BELLAIRE NAILS,

Office and Works, **Bellaire, Ohio.**

THE "WARNER" DOOR SPRINGS

are the most simple, most effective and most convenient ever introduced, and the immense sale we are having shows their great popularity and superiority.

There never was a Spring made that is so durable, so complete in its action, operating with a uniform pressure, holding the door tight when closed, and allowing it to open without increasing the pressure at any point.

When the door is opened about 130 degrees of a circle, it will press and hold it open.

The Spring is easily unhooked and rehooked—in an instant—from the door and also from the jamb, without removing a screw or pin.

This is a Convenience Possessed by no other Spring in the Market.

We are making this season three sizes, viz:

No. 1 For Screen or Light Storm Doors.

No. 2 For Medium Doors.

No. 3 For Heavy Doors.

They are for sale by most of the prominent jobbers of the United States and Canada.

Correspondence solicited.

FREDERIC BARTLETT,
FREEPORT, ILLINOIS.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

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SOUTHERN OFFICE: Cor. Eighth and Market Streets, Chattanooga, Tenn.—S. B. LOWE, Manager.

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One page.....	Gold, \$20.00	Gold, \$22.50	Gold, \$25.00	Gold, \$30.00	Gold, \$35.00	Gold, \$40.00
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SPECIAL ISSUES.

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THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual, presented free to every subscriber to the *IRONMONGER AND METAL TRADES' ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT,

With which is incorporated The Universal Engineer,

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This Supplement is published in

FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach out in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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Steel.

CARNEGIE BROS. & CO., LIMITED,
THOS. M. CARNEGIE, Chairman. PITTSBURGH, PA. D. A. STEWART, Treasurer.

EDGAR THOMSON STEEL WORKS DEPARTMENT.
Works at Bessemer Station, P. R. R.

Branch Office and P. O. Address, 48 Fifth Ave.,

MANUFACTURERS OF



Union Iron Mills Department
Mills at Thirty-third St. and A. V. R. R.

Branch Office and P. O. Address, Thirty-third St.

MANUFACTURERS OF

STRUCTURAL IRON.

Bridge Iron, Iron Beams, Channel Bars, Car Truck Channels, Angles, Tees, Universal Mill Plates, Bar Iron, Light Steel and Iron Rails.

Special attention given Unusual Shapes and Sizes.

Lithographs of sections and book of detailed information giving calculation of strain, &c., furnished to Engineers and Architects on application.

NEW YORK OFFICE: Room 32, No. 55 Broadway, N. Y.

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ESTABLISHED 1857. CAPITAL, \$3,000,000. INCORPORATED 1880.

Works at Chicago, Ill., and Milwaukee, Wis.

MANUFACTURERS OF

MERCHANT BAR, FISH PLATES, PIG METAL, IRON RAILS & BESSEMER STEEL RAILS.

Present Annual Capacity of these Works.	Fish Plates.....13,000 tons
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	Pig Metal.....10,000 "
	Iron Rails.....10,000 "
	Steel Rails.....10,000 "
	Total Capacity per year.....43,000 "

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WORKS AT DANVILLE, PA.

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A general assortment of mine and narrow gauge rails kept on hand, from which shipments can be made promptly.

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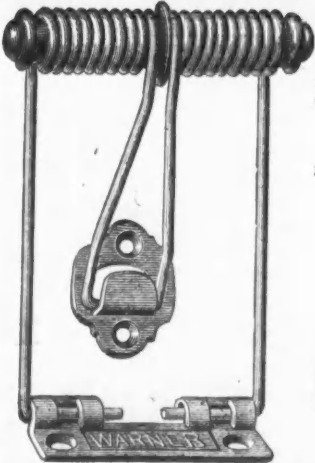
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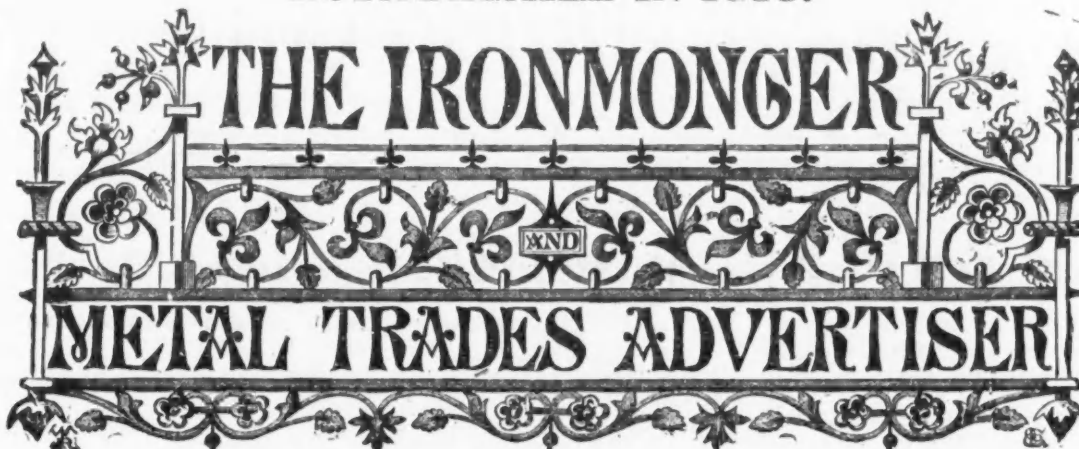
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B. KREISCHER & SONS,
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BEST AND CHEAPEST.
Established 1845.
Office, foot of Houston Street, East River,
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FIRE BRICK
Stove Linings,
Range and Heater Linings

Cylinder Brick, &c., &c.
M. D. Valentine & Bro
Manufacturers of
FIRE BRICK
And Furnace Blocks
DRAIN PIPE & LAND TILE.
Woodbridge, - - - N. J.

BORGNER & O'BRIEN,
Manufacturers
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AND
Edge Pressed Furnace Blocks,
CLAY RETORTS, TILES, &c.,
Twenty-third Street,
Above Race, PHILADELPHIA.
Twenty years' practical Experience.

BROOKLYN
Clay Retort and Fire Brick Works,
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Manufacturers of Clay Retorts, Fire Brick,
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Office, 88 Van Dyke St., Brooklyn, N. Y.

WATSON FIRE BRICK CO.,
ESTABLISHED 1856.
Successors to JOHN R. WATSON, Perth Amboy, New Jersey.
Manufacturers of

FIRE BRICK,
OR ROLLING MILLS, BLAST FURNACES, FOUN-
DRIES GAS WORKS, LIME KILNS, TANNERIES,
BOILER AND GRATE SETTING, GLASS WORKS, &c.
Fire Clays, Fire Sand, and Kaolin for Sale.

HENRY MAURER,
Proprietor of the
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Retort Works,
Manufacturer of FIRE BRICK, HOLLOW
BRICK AND CLAY RETORTS.
WORKS: PERTH AMBOY, NEW JERSEY.
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TROY FIRE BRICK WORKS,
Troy, N. Y.,
ESTABLISHED 1848,
Manufacturers of

FIRE BRICK,
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Dealers in Woodbridge Fire Clay and Sand, and Staten
Island Kaolin.

Established 1864.
GARDNER BROTHERS,
Manufacturers of

STANDARD SAVAGE FIRE BRICK,
TILE & FURNACE BLOCKS,
OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings, and
Miners and Shippers of Fire Clay.
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WORKS: Mt. Savage Junction, Md., and Lockport, Pa.

HALL & SONS,
FIRE BRICK,
Buffalo, N. Y.

CHAS. D. COLSON,
FIRE BRICK,
Foundry Facings, Sand, Tools and Supplies.
CHICAGO, ILL.

UNION MINING COMPANY.
Mount Savage Fire Brick.
EDWARD J. ETTING, Agent,
No. 230 South Third St., Philadelphia, Pa.

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(Established 1844).
FIRE and RED BRICK,
And Brickmakers' Tools in General.
SAML. P. MILLER & SON,
309 South 5th St., Philadelphia.

GEO. M. EDDY & CO.,
Manufacturers of
Measuring Tapes
Of Cotton, Linen & Steel.
FOR ALL PURPOSES.
351 to 353 Classon Ave., Brooklyn, N. Y.

HENRY DISSTON & SONS,



KEYSTONE SAW, TOOL, STEEL AND FILE WORKS,

Front and Laurel Streets,
PHILADELPHIA.

We have appointed
HAMMACHER & DELIUS, of Hamburg, Germany,
AGENTS FOR THE SALE OF OUR GOODS.

Any orders sent them will have the same prompt and careful attention as though they were
sent us direct. Hoping you will favor them with your orders, we are, Yours truly,

HENRY DISSTON & SONS.

Escutcheon Pins, Small Rivets and Screws,

And Specialties in this line made to order by
BLAKE & JOHNSON,
WATERBURY, CONN.

THE "EAGLE" ANVIL. WARRANTED!!



LATEST PATENT
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ESTABLISHED
1843.

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Louisville—W. R. BELKNAP & CO. Cincinnati—POST & CO. Cleveland—THE LAKE ERIE IRON CO.

NEWTON'S PATENT STEAM TRAP AND GRATE BARS,

MANUFACTURED BY
PROVIDENCE STEAM TRAP CO., Providence, R. I.
See The Iron Age first issue of each month. Agents Wanted for Different Locations.

ROCKING BLOCK GRATE,

Williams' Patent,
J. Q. MAYNARD,
General Agent,
97 Liberty Street, NEW YORK.
Fire level. Accumulation of cinders impossible.
No cleaning out of fires during the day. Parts
easily and cheaply replaced. Seventy per cent.
of air space. Thirty days' trial.
Send for circular.

GREEN'S PURE SILICA FIRE BRICK,

MADE BY
LACLEDE FIRE BRICK MANUFACTURING CO.,

SPECIALLY ADAPTED FOR
Pernot and Siemens Open Hearth
Steel Furnaces and for Glass Furnaces.
Office, 901 Pine St., St. Louis, Mo.

COXE BROS. & CO., Cross Creek Lehigh Coal.

The Purity and Strength of this Coal especially adapt it for the working
of Iron and Metals.

GENERAL OFFICE, Room 12 Trinity Building, 111 Broadway, New York
BRANCH OFFICES: Chicago, Ill., 64 Dearborn Street.
Philadelphia, 206 Walnut Place.
Boston, 26 Exchange Place.

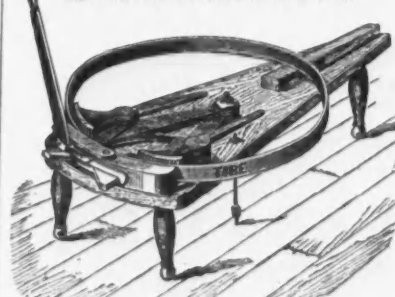
E. B. & S. W. ELY, Agents, P. O. Box 262, N. Y.

Better than the Best English Anvil.

Face in one piece, of BEST TOOL CAST STEEL. PERFECTLY
WELDED, perfectly true; of hardest temper and never to come off
or "settle." It does not bounce the hammer back, and therefore
can do more work with lighter hammer. Horn of tough untempered
steel, never to break or bend. Only Anvil made in United States
fully warranted as above. None genuine without our trade-mark.

N.B.—That the "Eagle" Anvil is the only one
made at Trenton, New Jersey, and it must not be mistaken
for an Anvil in the market called Trenton, but which is
really of foreign manufacture, and an imported imitation of
the English Anvil.

BLACKSMITHS, HARDWARE MEN AND AGENTS SHOULD READ THIS.



LITTLE GIANT WAGON TIRE UPSETTER.

This machine is strong, durable and cheap, and it
superior to all others for upsetting or shrinking
wagon tires, and bars of Iron without cutting them.
I will upset tires one inch at a heat, and is adapted
to tires of any size or diameter. Every Blacksmith
should have one; they are the best selling machines
hardware merchants and agents ever handled.
Price only \$12.00. Send for circular.

LITTLE GIANT MFG. CO.,
Millport, Chemung Co., N. Y.

HOWARD IRON WORKS, BUFFALO, N. Y., Manufacturers of

BOLT CUTTERS

AND NUT TAPPING MACHINES,
(Schlenker's Patent.)
Send for Illustrated Catalogue.

John T. Lewis & Bros.
No. 231 South Front St.,
PHILADELPHIA.



Pure White Lead, Red Lead, Litharge,
Orange Mineral, Linseed Oil,
AND PAINTERS' COLORS.

Brooklyn White Lead Co.



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JOHN JEWETT & SONS,
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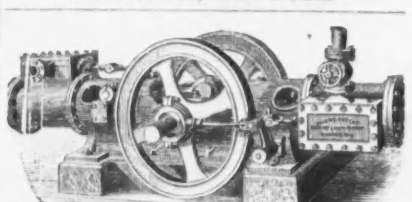


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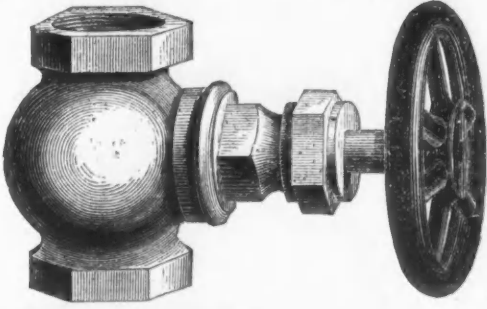


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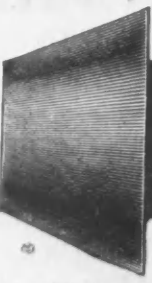

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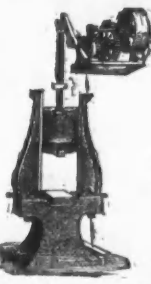

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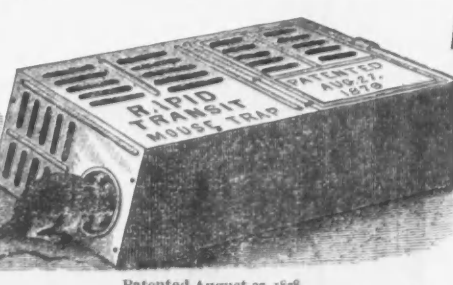
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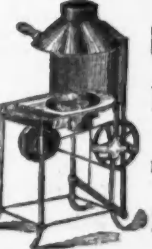
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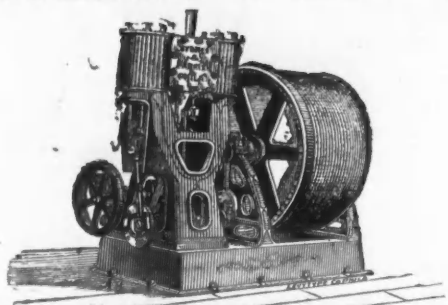
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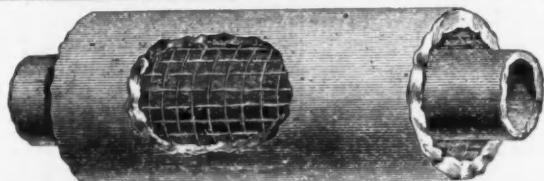
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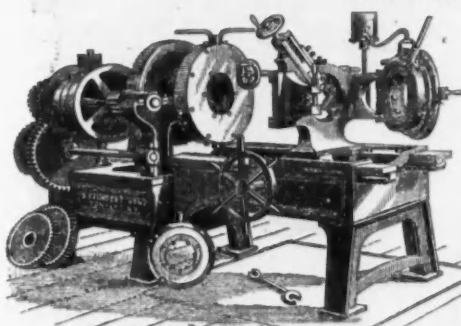


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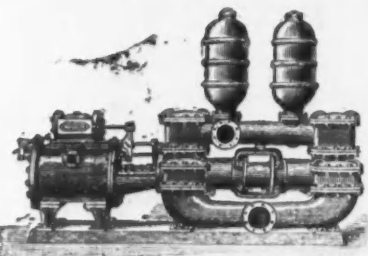


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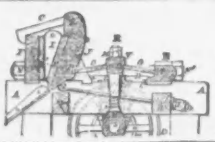
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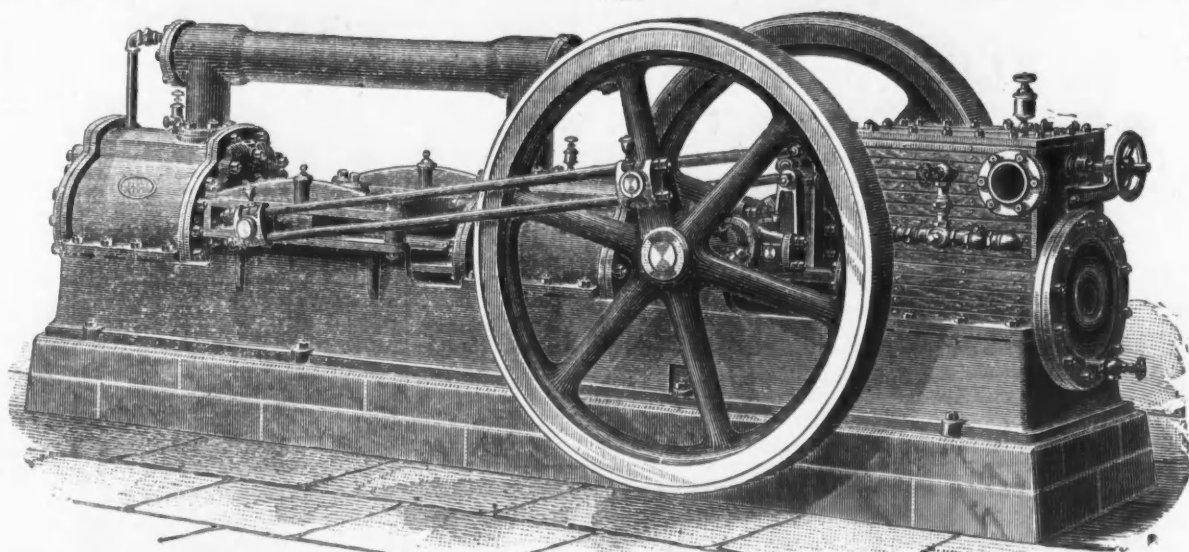
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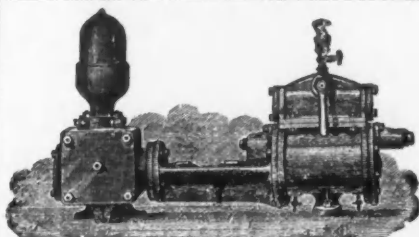
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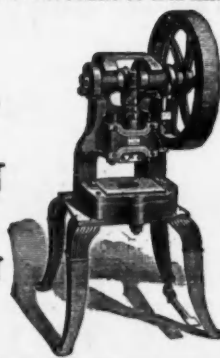
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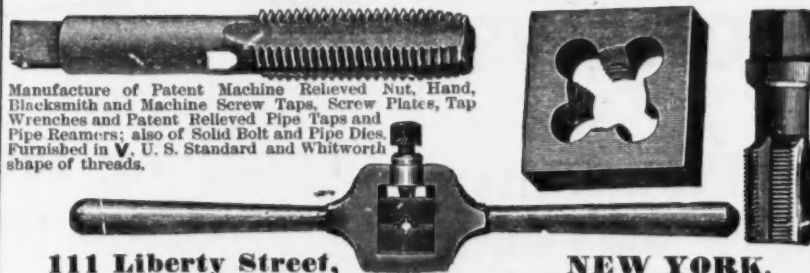
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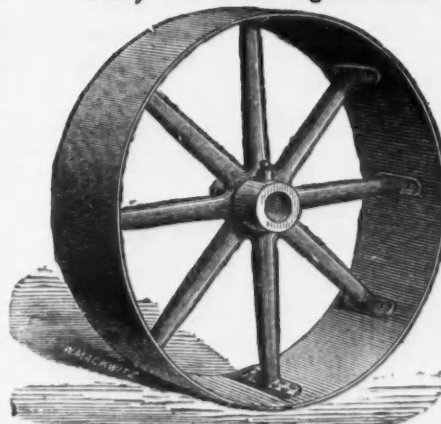
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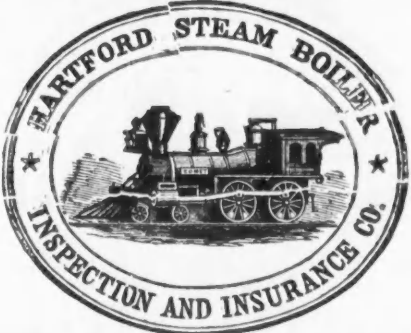
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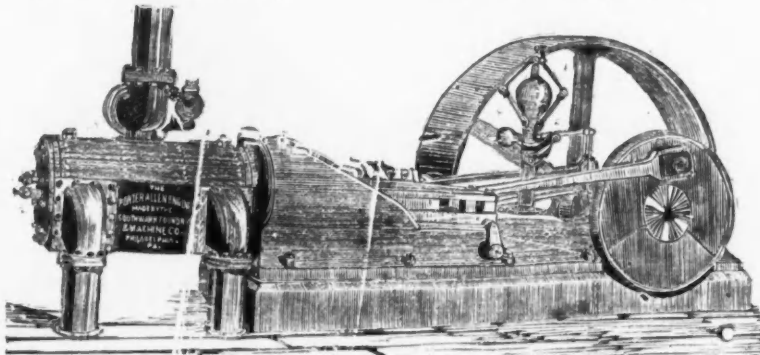
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ONCE MORE AHEAD.

FIRE! FIRE! FIRE!!!

From NATIONAL LINE, Pier No. 39, North River, Foot of Houston St.,
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PULSOMETER STEAM PUMP CO.

In addition to my memo. dated March 3, I specially desire to inform
you of the working of your No. 3 New Pulsometer as a fire extinguisher.

After having done with it for the purpose that it was intended for
pumping water from the coffer dam, I had it placed in the fire room
simply for storage in case it should be required again for the same
purpose. Afterwards, it was put up for washing down the wharf, and
by applying a 1/4 inch nozzle, salt water was drawn from the river and
thrown a perpendicular distance of 10 feet; so in case of fire on any
part of the pier the pump can be set working almost instantly.

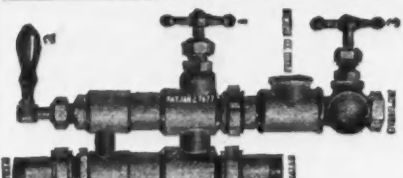
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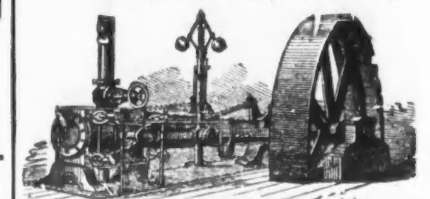
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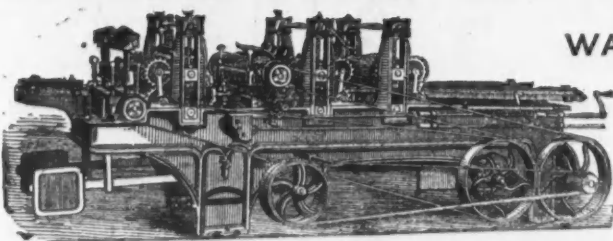
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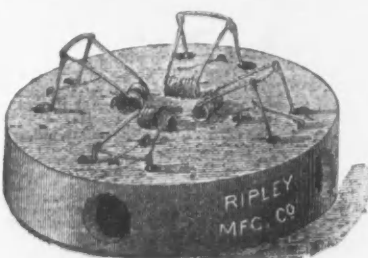
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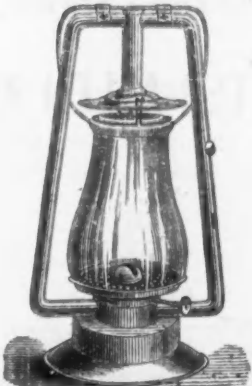
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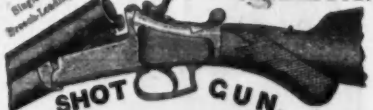
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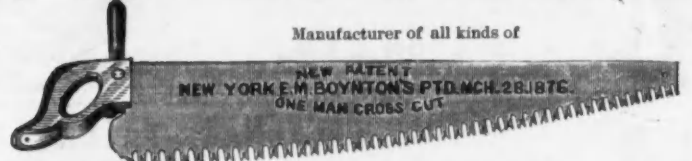
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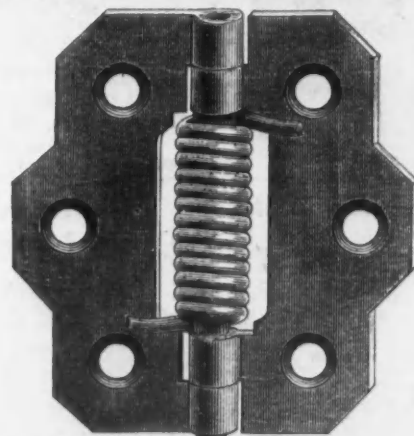
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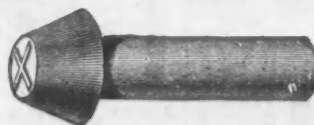
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